

The
NEW UNIVERSAL
ENCYCLOPEDIA

Volume 8

Checked

The NEW UNIVERSAL ENCYCLOPEDIA

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Revising Editor
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Checked
1937

VOLUME 8

HANS - JANE

LONDON: THE EDUCATIONAL BOOK CO., LTD.

VOLUME

8

Hansard. Popular name for the Parliamentary Debates Official Report of the British houses of parliament, named after Luke Hansard (1752–1828), a Norwich compositor. As printer in the house of commons after 1803, he continued Cobbett's Parliamentary History under the title of Hansard's Parliamentary Debates. These reports, issued by himself and his family down to 1889, were at first taken from the newspapers and revised by members. Following actions for libel, the reports were protected by the privileges of the house of commons in 1840, but not until 1857 did the Treasury subsidise them.

In 1889 Hansard became a public company, and when this was wound up the work was done by contract, the reports from 1895 to 1908 being supplied by The Times staff. Then the state took control, and from 1909 the debates were reported verbatim by a government staff; James Dods Shaw (d. 1916) was the first editor. The Speaker and the Lord Chancellor (for debates in the house of lords), assisted by the debates publication committee, are the final authority in the event of complaints as to the reporting. From 1946 Hansard was printed on rotary presses like a newspaper. It can be bought by the public, in a daily or a weekly edition, while parliament is in session.

Hansard is official only in the sense that it is by reporters officially appointed as part of the staff of parliament; the statutory text of parliamentary proceedings is in the Journals of the two houses. *Consult* Printer to the House: the Story of Hansard, J. C. Trewin and E. M. King, 1952; History in Hansard, 1803–1900, compiled by S. King-Hall and A. Dewar, 1952.

Hansard Society FOR PARLIAMENTARY GOVERNMENT, THE. Organization founded in 1944 by (Sir) Stephen King-Hall to promote knowledge of, and interest in, parliamentary government. It publishes a quarterly, Parliamentary Affairs, sent free to members, as well as books and pamphlets. It also arranges lectures, and answers inquiries on parliamentary matters. Its office is at 39, Millbank, London, S.W.1.

Hanseatic League OR HANSA. Association for trade formed by the commercial towns of N. Germany in the later Middle Ages. When not only every country but every town regarded the presence of foreign traders as a necessary evil and the traders themselves as persons to whom no facilities

should be conceded, no one could trade abroad without having at his back an association of which he was a member. Each trading town became a trading association. While they retained their mutual jealousies, they gradually realized the advantages of combination for trading in foreign lands, exacting concessions, and acting in concert against piracy. Such loose leagues were formed by the towns engaged in the Baltic trade and in the North Sea trade, there being several of these in the early 13th century.

The first Hansa or association which obtained concessions in England was that of the Merchants of Cologne, who gradually admitted the Hansas of other towns. In 1282 the German Hansa, which included Cologne, Hamburg, and Lübeck, was established; this prepared the way for a more general combination into the Hanseatic League of the North German commercial towns. The league became so powerful that it was able to dominate the foreign trade of Scandinavia, and even to some extent of London. Wisby, on Gothland, was its great entrepôt. Much of the history of English commerce in the 14th and 15th centuries is of the efforts of the English associations, the Merchants of the Staple and the Merchant Adventurers, to restrict the privileges of the Hansa in England and to extort corresponding privileges from the Hanseatic towns in Germany.

The League even acquired a political domination in the Baltic; but by the end of the 15th century its power was waning; by the middle of the 16th century it had lost all its privileges in England; geographical discoveries and maritime developments had provided new pathways for commerce, and by the opening of the 17th century the League had ceased to be of great account. Its doom was sealed by the disintegration of Germany that resulted from the Thirty Years' War.

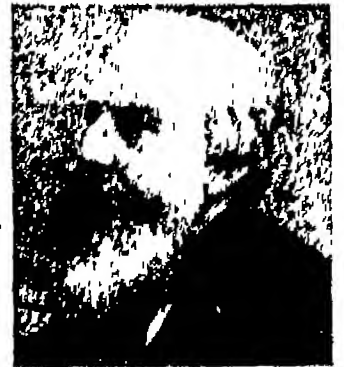
Hansen, (GERHARD HENRIK ARMANOE (1841–1912). Norwegian physician. As a doctor in Copen-

hagen he carried out extensive research work into the cause of leprosy, which had previously been believed to be associated with the consumption of decomposing fish. Hansen isolated the bacillus leprae, which causes the disease. The provision of hospitals or sanatoria for leprosy patients in Norway led to a great reduction of the disease there.

Hansen, PETER ANDREAS (1795–1874). Danish astronomer. Born in Slesvig, Dec. 8, 1795, he became director of the Seeberg observatory near Gotha. Having turned his attention to lunar observation, he issued Tables de la Lune, 1857, published by the British government, which awarded the author £1,000. Foreign member of the Royal Society, and holder of the Copley medal, 1850, in 1842 and 1860 he received the gold medal of the Royal Astronomical Society. He died at Gotha, March 28, 1874. The work of Hansen, one of the most profound mathematical astronomers, formed the basis of many calculations used in the preparation of The Nautical Almanac.

Hansi. Town of Punjab, India, in Hissar district. One of the oldest places in N. India, it has cotton ginning and pressing factories. There is rly. connexion with Delhi. Pop. (1951) 25,837.

Hansom Cab. Type of horse-drawn vehicle. An improved cabriolet, it was invented by Joseph Aloysius Hansom (1803–82), a Yorkshire architect, who in 1834 registered a "patent safety cab." Its chief features were two great wheels and a dickey seat for the driver placed above the body of the cab, which gave the passenger an uninterrupted view, thus earning for it Disraeli's name "the gondola of London." There was an arrangement for preventing the cab from tipping if the horse over-balanced. Later improvements included double doors in front with sliding glass folding panels, lowered from the roof by the driver. The hansom was especially characteristic of the London scene around the turn of the 19th–20th centuries, when some 7,000 plied for hire. Its use declined as motor traffic grew, but a few survived up to the 1930s. See Cab illus.



J. A. Hansom,
inventor of the cab

Hansson, PER ALBIN (1885–1946). A Swedish politician. He was born at Fosie, in Gothland,

Oct. 28, 1885, and began to earn his living as an errand boy. In 1905 he joined the Social Democratic youth movement, becoming editor of the party's leading newspaper in 1917. He entered parliament in 1918 and assumed leadership of the Social Democrats in 1932. Hansson was prime minister of Sweden from that year, except for a few months in 1936, until he died suddenly in Stockholm, Oct. 5, 1946. He was regarded as the exponent of a policy of cautious but steady democratisation.

Hanswurst. Traditional character of the German stage; equivalent to the English Jack Pudding. The sausages familiarly associated with the clown in the modern harlequinade may have their origin in Hanswurst, which means literally Jack Sausage.

Hanumān. Monkey god in Hindu tradition, worshipped as the type of a faithful servant. In the *Ramayana* (q.v.) he is described as helping Rama to rescue his wife Sita from Ceylon, whither she had been carried. Hanumān discovered her, and with his monkey forces helped to build the bridge by which Rama and his army crossed from the mainland to Ceylon.

Hanway, JONAS (1712-86). English traveller and philanthropist, born at Portsmouth, Aug. 12, 1712.



Jonas Hanway,
English traveller

He was in business at Lisbon and then at St. Petersburg, which he left in 1743 to sell woollen goods in Persia. In 1750 he came to England, issuing an account of his travels in 1753. During 1762-83 he was a commissioner of the victualling office. He secured Acts for registering parish infants and for having them brought up not in workhouses but in cottages. He founded the Magdalen Hospital for women; was the first celebrity to use an umbrella in London; and made a violent attack on the habit of tea-drinking, answered by Dr. Johnson. Hanway died Sept. 5, 1786. A Life by R. E. Jayne appeared in 1929.

Hanwell. Residential area of the Middlesex borough of Ealing, England. It is served by main line rly., trolley-bus and bus services. There are cemeteries for Kensington and Westminster. The chief church is St. Mary's. St. Bernard's (formerly Hanwell mental) hospital is in Southall. The

Brant separates Hanwell from Southall, and the Grand Union canal is important here.

Hanworth. District of Middlesex, England, within the urb. dist. of Feltham. It is on the "Cardinal's river" made by Wolsey for the supply of Hampton Court. The old manor, once belonging to Catharine Parr and the home of Elizabeth I for a time during her childhood, was destroyed by fire, 1797. There was a private flying park here 1929-46.

Hanworth, ERNEST MURRAY POLLOCK, 1st VISCOUNT (1861-1936). British lawyer. Born Nov. 25, 1861, and educated at Charterhouse and Trinity Coll., Cambridge, he was Conservative M.P. for Warwick and Leamington 1910-23. Made K.C. in 1905, he was recorder of Kingston-on-Thames, 1911-23. He was also appointed solicitor-general, 1919, attorney general 1922, and master of the rolls 1923-35. Created baron in 1926 and viscount in 1936, he died Oct. 22, 1936.

Hanyang. An ancient city of China, oldest of the three forming the triple city of Wuhan, capital of Hupei prov. A large industrial centre, Hanyang stands at the junction of the Han river with the Yang-tse. During the revolution of 1911 most of it was razed.

Haparanda. Town of Sweden, in the län or govt. of Norrbotten. It stands at the head of the Gulf of Bothnia, on the W. arm of the river Tornea, and is connected by a bridge with the town of Tornea, in Finland. Its sea harbour is Salmis, 7 m. W. The Finnish-Swedish rly. runs through the town. Pop. 2,951.

Hapgood, EDWIN ALBERT (b. 1908). English footballer. He was born at Bristol, Sept. 24, 1908, and joined Arsenal football club from Kettering Town in 1927. He played



Hanway and his
umbrella
After an old print

over 40 times for England (counting war-time matches) and won five league championship medals with Arsenal, being one of the greatest full-backs of his time and an excellent captain. He served with the R.A.F. during the Second Great War, and retired from ac-

tive football in 1945, becoming manager of Blackburn Rovers.

Haploid. Term primarily applicable to any nucleus which contains a single set of chromosomes; but also used of structures in which such nuclei occur. Nuclei of gametes are normally haploid, as are the gametes themselves and gametophytic structures such as the thallus of *Spirogyra* and the prothallus of the fern. In every cell of an animal there is normally a constant number of chromosomes common to that species. At gametogenesis, the various germ cells undergo a specially modified division which leads by a process of meiosis (q.v.) to a reduction of this number to half in the products of the division. These products, gametes, containing half the normal number of chromosomes, are called haploid cells. The union of two at fertilisation gives an organism with the whole number again, which is said to be diploid.

Hapsburg or **HABSBURG.** Name of the family that ruled over the empire of Austria-Hungary until 1918. Members of the family were German kings and Holy Roman emperors from 1438 to 1806, and kings of Spain from 1516 to 1700. The name Hapsburg or Habichtsburg, meaning hawk's castle, was taken in the 11th century from the family seat, a castle near the junction of the Aar with the Rhine. Counts and afterwards landgraves in Alsace, they produced one Rudolph, who made himself useful to the emperor Frederick II.

The first great Hapsburg was another Rudolph, in 1273 chosen German king. Wresting Austria and Styria from the king of Bohemia and giving them to his own sons, he began the family's long connexion with Austria. Rudolph's son Albert became German king, although not immediately on his father's death, and for a short time his son, another Rudolph, was king of Bohemia. In 1314 another Hapsburg was chosen German king but in 1322 he was disinherited, and for about a century the family was perforce content with ruling Austria and its attendant duchies.

The usual frequent subdivision of their lands between the various members of the family occurred, but these partitions did not prove permanent, a fact which contributed to the rise of the house. In 1437 Albert of Hapsburg, who had married a daughter of the emperor Sigismund, inherited his father-in-law's kingdoms of Hungary and Bohemia. In 1438 he was chosen German king and thus be-

came emperor. The two kingdoms were lost to the family when Albert's son Ladislaus died without sons in 1457, but Frederick, another member of the family, had already secured the German throne.

Frederick was the strange monarch who dreamed of the future greatness of the Hapsburgs; but it was his son, Maximilian I, who translated these dreams into realities. He himself married Mary, daughter of Charles the Bold, duke of Burgundy, and his son Philip married the heiress of Castile and Aragon. In this way his grandson Charles V received in 1519 a vast inheritance. His brother Ferdinand, by a marriage, secured the kingdoms of Hungary, and Bohemia for the Hapsburgs, who kept them until 1918. Henceforward there were two main branches of the Hapsburgs—Austrian and Spanish.

In 1556 Charles V was followed as emperor by Ferdinand, whose line was more fortunate. One after another succeeded to the hereditary Austrian lands and was elected emperor. The Hapsburgs' hold on Bohemia was shaken by the Thirty Years' War and on Hungary by the advances of the Turks, but both dangers were repelled. Maximilian II succeeded Ferdinand, and after the brothers Rudolph and Matthias came Ferdinand II and III and Leopold I. With the death of Charles VI, the male line ended in 1740.

Fortunes of Later Hapsburgs

The existing Hapsburgs are descended from Maria Theresa, the daughter of Charles VI, and her husband Francis of Lorraine (the emperor Francis I)—hence the family is sometimes called Hapsburg-Lorraine. Two of their sons, Joseph II and Leopold II, were elected emperor. A grandson, Francis II, was the last Holy Roman emperor and the first to call himself emperor of Austria. A succession of younger members of the family ruled over Tuscany, which Francis of Lorraine had brought to the common stock. About this time the family increased rapidly, and in the 19th century there was a bewildering number of archdukes. In 1859 the Hapsburgs lost Tuscany, but in Austria-Hungary Francis Joseph, in spite of several humiliations, was still emperor and king when he died in 1916. His grand-nephew Charles lost all in 1918, and the various Hapsburgs became private persons.

Hara, TIEZO. Japanese sailor. As vice-admiral commanding



Hari-Kiri. Scene, after a Japanese print, at the condemnation of a samurai to the suicide made obligatory by Japanese feudal custom

Japanese naval forces in the Andaman Is. 1942-45, he was responsible for the ill-treatment and transportation of 236 Indians to Havelock I., where all but 13 died. He signed the surrender at Port Blair on Oct. 9, 1945. He was tried by a British military court at Singapore as a war criminal, sentenced to death April 4, 1946, and hanged June 18.

Hara-kiri (Jap., belly-cut). Form of suicide by disembowelling practised in Japan. The custom originated as a means of honourable death among the medieval feudal nobles, and in the 14th century obligatory hara-kiri was recognized by the mikado as the privileged form of execution for a samurai convicted of disloyalty or breaking the law. The ceremony consists in ripping up the stomach from left to right.

Obligatory hara-kiri was abolished in 1868, but the voluntary form—committed from loyalty to a dead superior or as a protest against a living one, or out of desperation—survived. A notable modern instance is that of General Nogi and his wife, through grief at their emperor's death in 1912. Women out the throat. *Seppuku*, the Japanese pronunciation of the Chinese synonym *chi 'eh fuh*, is the more elegant term for this method of "happy dispatch."

Haran. See *Harran*.

Harappā. Site of a prehistoric city whose ancient name is unknown, one of the cradles of the great Indus Valley (*q.v.*) civilization which flourished c. 2500-1600 B.C. Situated in the Montgomery district of Pakistan, on the r. Ravi, a tributary of the Indus, some 300 m. N.W. of Delhi, the

ruins occupy a great mound, sadly denuded in parts where it was used as a brick quarry in modern times. Intersecting streets with well built houses, a municipal granary, and a heavily fortified citadel have been excavated.

Harar OR **HARRAR.** Town of Abyssinia. The capital of the prov. of the same name, it lies in the E. highlands, some 240 m. E. of Addis Ababa. An old walled town and trading centre, it is noted for the coffee grown in the neighbourhood. Pop. 25,000. The town was occupied by British Imperial forces in 1941 (see *East Africa Campaign*).

Somali peoples, many of them Mahomedans, dwell in the prov. The duke of Harar, second son of the emperor Haile Selassie, took his title from this prov.

Harbin OR **KHARBIN.** Town of China, capital of Heilungkiang prov. It is on the Sungari river, 325 m. N.N.E. of Mukden. Here the Chinese Eastern rly., a branch of the Trans-Siberian, branches S. to Mukden and thence to Peking, Dairen, and Korea, while the main line continues to Vladivostok. Harbin was opened to foreign trade in 1909. After the Russian Revolution the town was much frequented by White Russians. It was developed by the Japanese, 1931-45. Russian airborne troops took over the city from the Japanese Aug. 20, 1945. When the Russians withdrew in 1946, Chinese Communists occupied it. Govt. forces recovered it, but, with the rest of Manchuria, Harbin was under Communist control by the end of 1948. The Communist govt. developed it as a tool-making centre. Pop. (est. 1955) 1,500,000.

HARBOUR: PROTECTION FOR SHIPPING

M. Nachshen, B.Sc., M.I.C.E., M.I.Struct.E

An explanation of the reasons governing the choice of sites for harbours; and a discussion of the means by which men make natural sites better, and create harbours in unfavourable positions. See articles on harbours mentioned; and on Breakwater; Concrete; Engineering; Mulberry Harbour; River; Tide; etc

A harbour is an area of water sufficiently enclosed and protected from storms to provide a place of shelter for ships. Where only partial protection is available, e.g. from islands, reefs, or shoals, the sea area is called a roadstead. A harbour should have safe and easy entrance from the sea in any weather, and preferably at any state of the tide. It should be large enough in area to accommodate all the ships likely to require to use it at one time, and deep enough to take the largest vessels wishing to enter it. Sufficient and convenient moorings should be provided and if possible the bottom should be a good holding ground for anchors. Where the harbour has quays or piers within it, or where dock-entrances or canals lead from the harbour, these should be in sheltered positions and so placed that a ship can easily come alongside the quays or turn into the entrances in any weather.

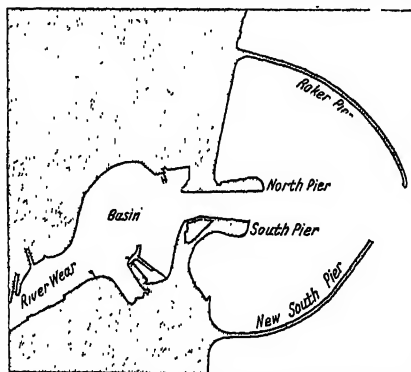
NATURAL HARBOURS. The most frequent form of natural shelter is provided by rivers and estuaries; but these are not generally called harbours. Such shelters have the additional advantage of providing, as a rule, ship routes some way into the interior. Most of the world's leading ports are on rivers, notably London, Liverpool, Glasgow, Dublin, Rotterdam, Antwerp, Hamburg, Bremen, Calcutta, New York. In some ports, such as Swansea, a river provides a means of access to a dock system, but is not sufficiently extensive or deep to form a harbour where ships can lie at moorings or at anchor.

River harbours often have to be artificially improved. Rivers bring down silt and tend to deposit it in the sea in front of the river mouth, where it forms a bar. Either the river itself or the bar may need dredging to maintain sufficient depth of water for the needs of shipping. This is particularly so at old-established harbours which were sufficiently deep for the ships of bygone days, but are not deep enough for the larger vessels of today.

The depth and constancy of a river or its entrance are frequently

improved by the construction of training walls or jetties to confine the river flow within a restricted channel and so to improve the scouring effect of its water. Often both dredging and training walls or jetties are necessary. Dredging on a large scale is frequently necessary—e.g. on the Thames, the Clyde, and the Mersey; examples of training walls are those on the Mersey, Ribble, Seine, and the Rotterdam New Waterway.

In some cases the jetties at the mouths of rivers are designed to provide shelter from waves as well as to train the river. In other cases the shelter is the first con-



Harbour, Sunderland, at the mouth of the R. Wear, has an outer harbour formed by two breakwaters

sideration and breakwaters are placed, as at Sunderland, so as to create a small outer harbour into which the river enters.

Southampton, on the rivers Itchen and Test, is sheltered by the Isle of Wight. New York also is sheltered by islands. Natural landlocked bays or arms of the sea or bays sheltered by islands, provided suitable depths of water exist or can be created, are excellent sites for harbours. Examples are Portsmouth, Stranraer, Belfast, Cork, Cobh (Queenstown), Galway, and many smaller places sheltered by the islands off the coasts of Scotland and Ireland. Farther afield are Sydney, Auckland, Wellington, Halifax, Vancouver, San

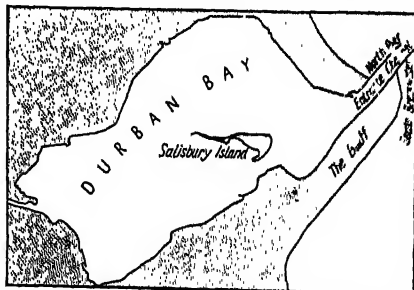
Francisco, Durban, S. Africa; Lagos, Nigeria; and Rio Grande do Sul, Brazil, all on large landlocked bays or arms of the sea. Venice is on a completely landlocked lagoon with three entrances.

ARTIFICIAL SHELTER. Many harbours have some natural shelter but have been completed by the construction of breakwaters. The natural shelter may be almost complete as at Plymouth, where a short breakwater completes the shelter of several square miles of deep water in Plymouth Sound and its branches. Portland is sheltered naturally from the W. by the Isle of Portland, which is a peninsula, and from the N. and E. by artificial breakwaters. Peterhead and Brixham harbours require artificial shelter from one direction only.

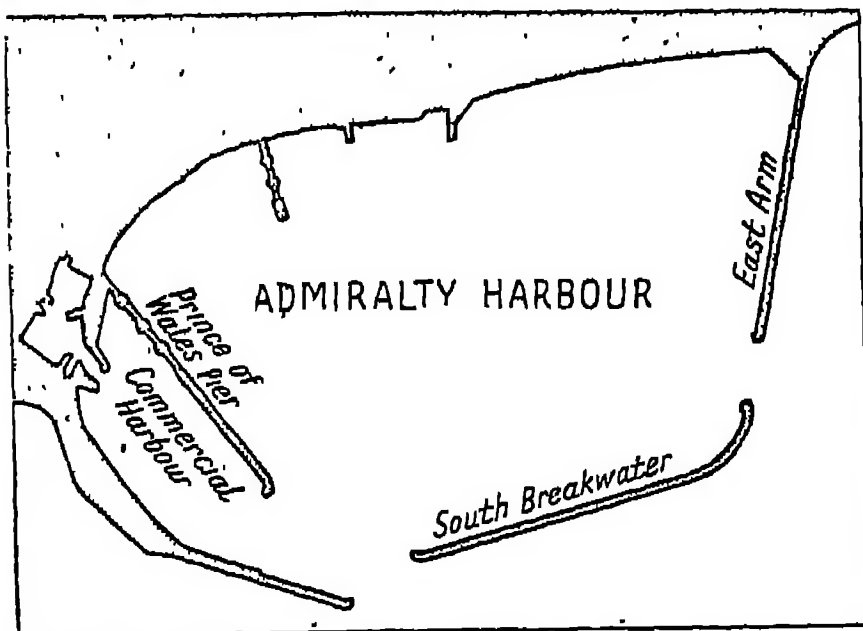
A particularly interesting example is Alexandria (see Alexandria map, p. 288), where there are two harbours separated by a peninsula, which, with a row of coral reefs, gave partial natural protection. This has been completed by breakwaters which partly follow the line of reefs. The peninsula itself is of artificial origin, having been formed by drifting sand held up by a causeway built over two thousand years ago to connect the mainland with the island of Pharos. The water area of the western harbour is so large that

a subsidiary internal breakwater has been constructed to shelter some of the quays against waves forming inside the harbour.

Examples of harbours with a smaller degree of natural protection, but where some shelter is obtained from a situation in a bay, or cover by promontories



Harbour, Durban Bay, a natural landlocked area of water, provides an excellent sheltered harbour



Harbour. Dover harbour, partly sheltered by high cliffs, has the added protection of several breakwaters

are Dover, Haifa, Colombo, and Barcelona.

At Genoa (see Genoa map, p. 3699) and Marseilles their original small harbours were naturally sheltered in bays, but both have expanded and their newer parts are protected by breakwaters generally parallel with the shore.

Zeebrugge, on an open coast, is sheltered by a single curving breakwater. Madras is an entirely artificial harbour enclosed by breakwaters on three sides. The original construction was of two breakwaters 1,200 yds. apart, at right angles to the shore and curving inwards at their outer ends to leave an entrance 500 ft. wide facing E., or seaward. The harbour silted up so rapidly that the original entrance had to be closed and a new one cut facing N. and protected by a new breakwater extending from the N.E. corner.

PLANNING A HARBOUR. Among the points which the layout in plan of an artificial harbour must take into account are: (a) the configuration of the coast and nature and levels of the sea bed; (b) the direction and forces of greatest and most prevalent winds and storms, and the size and direction of waves resulting from them; (c) the tides and currents; (d) the drift of solid material; (e) the size and number of ships to be received, and whether they are to enter at all states of the tide or around high tide only; (f) whether the area between the breakwaters is to constitute the whole of the port, e.g. Dover, or whether it is to be an outer harbour to a river or to docks; (g) the provision to be made for land traffic; (h) cost.

Full advantage should be taken of partial natural protection, and also

of any reefs or shoals which will reduce the height of the breakwaters. The harbour mouth should be as far seaward as possible, and so placed that a ship failing to make it can easily turn and try again. For ease of entry in a storm the entrance should face the direction of maximum storms, but as this exposes the interior to waves, a compromise is usual.

If the direction of entrance is such that a ship would have to turn broadside on to the direction of the storm, the water just outside the entrance can be sheltered by prolonging the windward breakwater to overlap the lee one, or by covering the entrance by an island breakwater. Methods of constructing breakwaters are considered under the head Breakwater.

In some places two entrances are necessary to ensure safe entry under all conditions. According to the direction of the breakwaters and of the entrance, solid material travelling along the shore may enter the harbour or pass it by. The width of an entrance between breakwaters is generally related to the length of the largest ships. Six hundred feet or so is a common width, but there are great variations. Judgement and compromise are necessary as a wide entrance tends to reduce the shelter in the harbour, while a narrow one may be dangerous in rough weather, and is conducive to fast currents and eddies in tidal seas, or where there is much river water to pass through the entrance. To be of maximum service, the depth of harbour entrances should be sufficient to admit a ship to shelter at any state of the tide and to allow for the vertical movement of the ship due to large waves.

Within the harbour the water space should widen in funnel shape so that waves will be rapidly spread and dissipated. In some cases wave traps or spending beaches are contrived inside the harbour mouth where the waves, spreading from the entrance, spend themselves on sloping beaches, while the vessel passes through a second entrance into calmer waters. There are natural spending beaches at Sunderland and Tynemouth, and artificial ones at Whitby and Blyth.

Harbour Grace. Port of entry in the S.E. of Newfoundland, Canada. It has a large exposed harbour on the W. of Conception Bay, a courthouse, and an R.C. cathedral. There is rly. connexion with St. John's. Pop. (1951) 2,331.

Harburg-Wilhelmsburg. Seaport of Germany, on the Elbe in the Land of Lower Saxony. S. of and adjoining Hamburg. The towns of Harburg and Wilhelmsburg, merged in 1927, and in 1937 absorbed in the Hansa city of Hamburg, are linked by two bridges over the Elbe, each over 2,000 ft. long. Important industries were mineral oil, margarine, chemicals, textiles, and rubber; the port, administered in common with those of Hamburg and Altona, had before 1939 a traffic of about 4,500 seagoing vessels a year in and out; some 5,000,000 tons of merchandise were handled annually by sea and 2,000,000 by inland navigation. Harburg received its charter as a city about 1300; in 1376 it fell to the house of Celle-Lüneburg, and in 1866 to Prussia. It was severely damaged by bombing and land fighting in the Second Great War. Pop. 118,193.

Harcourt, LEWIS HARCOURT, 1st Viscount (1863-1922). British politician. He was born Feb. 1, 1863, the elder son of Sir William Harcourt, and was educated at Eton. For many years he acted as private secretary to his father. In 1904 he entered the house of commons for Rossendale, and in 1905 joined the Liberal ministry as first commissioner of works. Later he entered the cabinet, and during 1910-15 was colonial secretary, reverting to his former post of commissioner of works when the Coalition government was formed in 1915. He resigned with Asquith in 1916, and was made a viscount in 1917. This title had been held by earlier Harcourts, whose estate at Nuneham he inherited. He died Feb. 24, 1922, his son William (b. 1908) succeeding to the peerage.



Viscount Harcourt, British politician

Harcourt, SIMON HARCOURT, 1st Viscount (c. 1662-1727). English lawyer. The only son of Sir Philip Harcourt, he belonged to the family that, coming from Normandy, had made its home in Oxfordshire, where Stanton Harcourt commemorates the fact. Simon was born at the manor

house and educated at Pembroke College, Oxford. In 1690 he entered parliament as M.P. for Abingdon, and in 1702 he became solicitor-general and a knight. In 1707-08, and again in 1710, he was attorney-general, and later in 1710 was made lord keeper of the great seal. In 1711 he was created a baron; in 1713 he became lord chancellor, but like other Tories he lost his office when George I became king in 1714; in 1721 he was made a viscount. He died July 23, 1727. Swift referred to him as "trimming Harcourt."



Simon, Viscount Harcourt, English lawyer

Harcourt bought Nuneham, which is still the family seat. His son, Simon, predeceased his father, so the latter's heir was his grandson, Simon (1714-77). He was viceroy of Ireland, 1772-77, having previously been governor to the prince of Wales, afterwards George III. In 1749 he was made an earl. His two sons succeeded in turn to the titles and estates. The younger of these, William, the 3rd earl (1743-1830), served in America and in Flanders, becoming a field marshal. When he died the titles became extinct.

Harcourt, Sir William George Granville Venables Vernon (1827-1904). A British



Sir William Harcourt, British statesman

statesman. The son and grandson of clergymen, his grandfather being archbishop of York, he was born at York, Oct. 14, 1827. The archbishop was originally named Vernon, but took the name of Harcourt on succeeding to the estates of that family. Educated privately and at Trinity College, Cambridge, William was called to the bar. He was made Whewell professor of international law at Cambridge, and held this post until 1887. He was knighted in 1873.

By birth a Whig, Harcourt joined the Liberal party, and in 1868 entered the house of commons as M.P. for Oxford city. He was member for Derby from 1880 to 1895, when, being rejected there, he was returned by W. Monmouthshire, retaining that seat until his

death. He entered official life as solicitor-general under Gladstone in 1873, going into opposition in 1874. In 1880 he was made home secretary; he had to deal with the Fenian outrages, and the Irish malcontents found in him one of their most vigorous assailants. In 1886 he was for a few months chancellor of the exchequer, having adhered to Gladstone when the party was split over Home Rule; and then followed six more years in opposition.

In 1892 Harcourt, who is remembered for the remark "We are all Socialists now," returned to the exchequer, and in 1894 was responsible for the budget which established the graduated system of death duties. He succeeded Gladstone in 1894 as leader of the house of commons, but Rosebery became prime minister, and this was undoubtedly a bitter disappointment to Harcourt. From 1895 he led the party in opposition, but differences with his followers grew more pronounced, and he resigned in 1898. Henceforward he occupied a detached position, having little save hard words for the Conservatives and for the imperialist section of the Liberals. He died Oct. 1, 1904, having only just inherited the estates of the Harcourts. Endowed with an imposing presence and great mental gifts, he was a witty talker, forceful debater, and most attractive platform speaker. His *Life* by A. G. Gardiner appeared in 1923.

Harda. Town of the Madhya Union, India, in the district of Hoshangabad. It stands on the high road to Bombay, and has a rly. station with direct connexion to Jubbulpore 180 m. E.N.E.

It is a prosperous town with a good water supply, and a trade in cereals and oil seeds. Pop. 13,290.

Hardanger Fiord. Deep, ramified inlet on the W. coast of Norway. It opens S. of Bergen, and extends in a N.E. direction about 70 m. to Vik and Ulvik, which are about 115 m. from the open sea beyond the islands at its mouth. A branch, the Sörfjord, runs S. to Odde, passing the vast Folgefond snowfield. Among the many cataracts on the Hardanger Fiord are the Skjeggedalsfos and the Vöringfos.

Harden, Sir Arthur (1865-1940). British biochemist. He was born at Manchester and educated at Owens College there and Erlangen university. From 1888 to 1897 he was lecturer and demonstrator in chemistry at Owens College, and thence he

went to London as professor of biochemistry. Later he became head of the biochemical dept. of the Lister Institute. From 1913 to 1937 he was joint editor of the *Biochemical Journal*, in 1929 was joint recipient of the Nobel prize for chemistry, and in 1935 was awarded the Davy medal of the Royal Society for fundamental discoveries in the chemistry of alcoholic fermentation. Harden was knighted in 1936, and died June 17, 1940.

Harden, Maximilian Felix Ernst (1861-1927). German journalist and politician. Born at Berlin



Maximilian Harden, German journalist

Oct. 20, 1861, his real name was Witkowski; he became known as a satirical writer under the pseudonym of *Apostata*, and won the support of Bismarck and Caprivi. In 1892 he founded the weekly *Die Zukunft*, in which in 1907 he launched a campaign against Eulenburg, Kuno Moltke, and von Hohenhausen, which led to their disappearance from the imperial circle. He was several times prosecuted for *lèse-majesté*, and his paper was repeatedly suppressed during the First Great War. He died Oct. 30, 1927.

Hardenberg, Friedrich Ludwig von (1772-1801). German poet and romance writer, better known by his pseudonym of Novalis (q.v.).

Hardenberg, Karl August, Prince of (1750-1822). (German statesman. Born in Hanover, May 31, 1750, he was educated at Leipzig and Göttingen, afterwards entering the public service of Hanover. He was made a count, but left the service because of his wife's intimacy with the prince of Wales, later George IV. In 1782 he entered the service of Brunswick, and in 1792 was made administrator of Ansbach and Baireuth.

Hardenberg was soon busy on behalf of Prussia. On the outbreak of war against France he had been sent on diplomatic work, and helped to arrange the peace of Basel (1795). In 1804 he was made foreign secretary by Frederick William III, but in 1805 Napoleon insisted upon his retirement. He returned to his post in 1807; again the dictator had him dismissed. In 1810 he became chancellor, a moderate reformer, and carried on Stein's work in the reorganization of

Prussia. He supported the policy of making war on France in 1812, and had a share in arranging the settlement of 1814-15, being Prussia's chief representative at the congress of Vienna. He was a member of all the congresses between 1812 and 1822, but could scarcely maintain an independent line between Metternich of Austria and Nesselrode of Russia. He died at Genoa, Nov. 26, 1822.

Hardener. Type of alloy. Various elements may be added to molten metals to give a finished product harder than the pure metal. For convenience the additions are made in the form of alloys rich in the element required.

Harderwyk. Town of the Netherlands. In the province of Gelderland, about 46 m. due E. of Amsterdam, it is on the rly. between Amersfoort and Zwolle, and is a useful agricultural centre. Formerly a port on the Zuider Zee, it had a depot for recruits for the East Indian service. Harderwyk university, founded 1648 and well known in the 18th century, was closed in 1811. Pop. 8,650.

Hard Fern (*Blechnum spicant*). Fern of the family Polypodiaceae. It is a native of Europe, N.E. Asia, the Canaries, and N.W. America. The rootstock is creeping and scaly; the fronds are leathery, polished, long, and narrow, and deeply cut in from the margins to, or nearly to, the midrib. Fertile fronds have the divisions narrower and more distant; the barren fronds are broader, evergreen, more or less prostrate. The fertile fronds are twice the length of the others, erect, the under side of each lobe margined with the line of brown spore-cases. See Fern.

Hardhead, MATFELLON, OR GREATER KNAPWEED (*Centaurea scabiosa*). Perennial herb of the



Hardhead, leaves and flower-heads

family Compositae. It is a native of Europe and W. Asia. The long leaves are deeply cut into boldly toothed segments. The grooved flowering stem is from 2 ft. to 3 ft. in length, covered with soft hairs, branched near the top, each branch ending in a large bright purple (occasionally white) flower-head. The lower part of the head is almost spherical, of extreme

hardness, and invested with large rough scales with brown tips.

Hardicanute OR HARTHACNUT (c. 1018-42). King of Denmark and England. The son of Canute and his Norman wife, Emma, widow of Ethelred the Unready, he passed most of his time in Denmark, where he acted as his father's deputy. In 1035, Canute dying, he became king of Denmark, while Earl Godwin wished him to be king of England also. A contest between him and his half-brother Harold resulted in division of the kingdom between them, Hardicanute taking the S. or English part. He stayed in Denmark, seeking among other things the throne of Norway, and in 1039 his discontented English subjects placed themselves under Harold. Hardicanute then came to England, but his short reign was marked by brutalities, notably the ravaging of Worcestershire, and by a short quarrel with Godwin. He died, says the A.S. Chronicle, as he stood at drink, June 9, 1042.

Hardie, JAMES KEIR (1856-1915). Scottish politician. Born Aug. 15, 1856, at Cumnock, Ayrshire, he was a miner until at 24 he was appointed secretary of the county miners' union. He founded in 1887 The Miner, which became The Labour Leader. De-



J. Keir Hardie, Labour leader

feated at Mid-Lanark in 1888, he was elected by West Ham South in 1892, one of the first two Labour M.P.s (John Burns being the other). He appeared at the house of commons in a cap. He lost the seat in 1895, but represented Merthyr from 1900 until his death, Sept. 26, 1915. A bust was placed in the commons on Aug. 15, 1956.

Keir Hardie helped to found the Scottish Labour party and the I.L.P., of which he became chairman in 1893, and in 1899 effected a measure of cooperation between the T.U.C. and various Socialist bodies, which was to gain for his party 29 seats at the election of 1906. He hoped to persuade the Socialist International to call a general strike in the event of European war. Hotly as his views were contested, his integrity and character were never called in question.

Hardiman, ALFRED FRANK (1891-1949). British sculptor. He entered the Royal College of



Hardiman. Memorial to Earl Haig, by A. F. Hardiman, set up in Whitehall in Nov., 1937

Art in 1912, studying under Lantéri and gaining his diploma in 1916. He transferred to the R.A. schools and was Rome scholar in 1920. His works include stone groups for the County Hall extension at Westminster, and stone and bronze sculpture for the new city offices at Norwich. The memorial to Earl Haig in Whitehall aroused much criticism, many disliking the formal treatment of the charger. Hardiman was awarded the medal of the R.B.S. in 1939, and elected R.A., 1944. He died April 17, 1949.

Harding, WARREN GAMALIEL (1865-1923). President of the U.S.A. Born Nov. 2, 1865, in a farmhouse near Blooming Grove, Ohio, the son of a doctor, he was educated at the village school and a local college. Starting life as a schoolmaster, after two years he went into the printing trade, and in 1884 acquired the local newspaper of Marion, Ohio. He represented Marion in the Ohio senate 1899-1903, and from 1904 to 1906 was lieutenant-governor of the state. When Theodore Roosevelt split the Republican party, Harding followed Taft, whom he had nominated in 1912. In 1914 he was elected to the senate at Washington, where he was a member of the foreign relations committee.

Before 1914 he paid three visits to Europe to study fiscal and labour questions. On the outbreak of the First Great War he backed Roosevelt in trying to arouse President Wilson to a sense of impending emergencies, and when the U.S.A. entered the war



W. G. Harding, U.S. President

he favoured Roosevelt's plan for sending a volunteer division to France without delay.

In June, 1920, Harding was unanimously nominated Republican candidate for the presidency, as a compromise between the two extreme wings of the party. He was elected president in November by a sweeping majority, representing reaction from Wilson's international outlook, and public desire to concentrate on American affairs and so return to what Harding called "normalcy." The election also marked a reaction from that personal domination by the president which had characterised Wilson's administration. Harding was as approachable and friendly as his predecessor had been aloof and autocratic. The chief public events connected with his administration were the signing of the peace treaty with Germany, July 2, 1921; the passage of the Budget Act of 1921; and the holding of the Washington conference for the limitation of armaments, 1921. In San Francisco in the summer of 1923 he contracted pneumonia, following ptomaine poisoning, while returning from a visit to Alaska, and the crisis had no sooner passed than it was announced that he had died of an apoplectic stroke, August 2, 1923.

Corrupt Practices Revealed

Only after his death did it become clear that his administration had been characterised by rampant nepotism and corruption. A particularly notorious example of "graft" was discovered in the granting of various oil concessions by the secretary of the interior, from government oilfields in California and Wyoming. Corrupt practices had also made notorious the administration of the veterans' bureau, which existed to look after the interests of disabled ex-servicemen, as well as that of the alien property custodian. For a time it was widely rumoured that Harding had taken his own life. In a book by G. B. Means, *The Strange Death of President Harding*, it was implied that his wife had poisoned him. In another book, *The President's Daughter*, a self-alleged mistress of Harding claimed to be the mother of his illegitimate child. These personal implications and allegations remained unsubstantiated, but the administrative scandals alone were enough to mar Harding's posthumous reputation. The national memorial to him at Marion, where he was buried, remained undedicated until 1931.

Hardinge, HENRY HARDINGE, 1st Viscount (1785-1856). British soldier and administrator. He



H. Hardinge

After E. U. Eddis

was born at Wrotham, Kent, March 30, 1785, and educated at Eton. Having entered the army, he served in the Peninsular War, and in 1815 was with the Prussian army at Ligny, where he was wounded. In 1820 Sir Henry (K.C.B., 1815) became Tory M.P. for Durham, and in 1828 he became secretary at war under Wellington; in 1830 he was chief secretary for Ireland, as he was again in the Tory ministry of 1834-35. From 1841 to 1844 he was again secretary at war, resigning to become governor-general of India. He was there until 1852, carrying through the wars against the Sikhs and being rewarded in 1846 with a viscounty. From 1852 to 1856 he was commander-in-chief. He died Sept. 24, 1856. The fourth viscount (b. 1905) succeeded to the title in 1924. See Sikh Wars.

Hardinge of PENSURST, CHARLES HARDINGE, 1st BARON (1858-1944). British diplomatist. Born in London, June 20, 1858, a younger son of the 2nd Viscount Hardinge, he was educated at Harrow and Trinity, Cambridge. From 1880 he was in the diplomatic service, gaining experience in several capitals, especially St. Petersburg, 1898-1903 and 1904-06. Four years under-secretary at the foreign office, he was in 1910 appointed viceroy of India and raised to the peerage. In 1916 he left India and was made K.G. and again under-secretary for foreign affairs, in spite of the censure passed on him by the Mesopotamia commission. In 1920-22 he was ambassador to Paris. He died Aug. 2, 1944. His memoirs, *Old Diplomacy*, appeared in 1947.

Hardinge's temperament was too reserved to seek or win popularity; but he possessed sound judgement, great determination and industry, and a thorough knowledge of affairs. Grey described his reports to Whitehall as "real, full, authentic, and confidential."

Hardinge Bridge. Structure across the Ganges river. It is at Sarai, 45 m. E. of Patna, India, and was opened in 1917. A

fine feat of engineering, it has 15 girder spans of 345 ft. 1½ ins. with three land spans of 75 ft. at either end. The bridge makes possible transfer from the standard gauge railway S. of the river to the metre gauge rly. N. of it.

Hardinge Mill. Form of conical ball or pebble mill, much used in ore dressing (q.v.). The mill is charged with steel balls or hard pebbles of varying sizes; when it is rotated, the larger balls work to the portion with the largest diameter. The ore is fed in at this end and so first meets the heaviest balls falling from the greatest height. As it proceeds through the mill, the ore meets smaller balls and so is ground progressively finer.

Hardingstone. Village and parish of Northamptonshire, England. It is 2 m. S. of Northampton and is famous for its cross, the best preserved of those erected by Edward I to the memory of his wife Eleanor. There is an old church dedicated to S. Edmund, and the Nca runs through the parish, as does the Grand Union Canal. The battle of Northampton, July 10, 1460, at which Henry VI was defeated and taken prisoner, was fought on Hardingstone fields. There are remains of a Roman camp. See Northampton, Battle of.

Hard Labour. British legal term. Imprisonment with hard labour, long obsolescent, was abolished by the Criminal Justice Act, 1948. Compelling a prisoner to undertake drudgery is an old practice which was extended in 1775 when, on the revolt of the American colonies, imprisonment with hard labour was substituted for transportation to America. By an Act of 1778 the labour was required to be "of the hardest and most servile kind in which drudgery is chiefly required," e.g. working a treadmill. It was considered desirable not only that the work should be exacting and monotonous but that the prisoner should also know it was perfectly useless.

The Prisons Act, 1865, specified hard labour of two classes, the more severe involving work at the treadmill, crank, or capstan, shot drill, or stone-breaking. The Gladstone committee appointed by Asquith in 1894 endeavoured to stress the reformatory rather than the deterrent aspect of punishment, and condemned unproductive hard labour; but separate confinement was retained for the first 28 days of sentence. Picking oakum was at one time the prescribed task. When that was abolished there was no distinction between the work

done by those prisoners sentenced to hard labour and the others. The former worked for 28 days in solitary confinement and slept for 14 days without a mattress. Both these distinctions have been abolished.

Hardness. A mechanical property of materials. The mineralogist uses a test for hardness as an aid to the identification of minerals, noting the effect of scratching with a knife or file or with another mineral. The standard Mohs scale (*q.v.*) ranges from talc to diamond. For example, if a mineral will scratch quartz, but is itself scratched by topaz, it is said to have a hardness between 7 and 8. Such methods are too crude for the metallurgist. The hardness of a metal is an intrinsic property, bearing a relationship to the ultimate tensile stress, and of value in estimating its resistance to wear, or power to withstand heavy loading. Common methods of calculating hardness depend on the measurement of the depth of penetration by a hard steel ball or diamond pressed into the surface by a known load. In the scleroscope test, a pointed diamond is loaded and dropped on the surface, the distance of rebound being proportional to hardness. See Brinell Hardness; Vickers Hardness.

Hardness. Term used to describe the soap-destroying power of a water. It is expressed in the U.K. in degrees (Clark or English), *i.e.* as calcium carbonate, grains per gallon or parts per 70,000. The standard of 1 part per 100,000 is becoming generally adopted; to convert this into grains per gallon multiply by 0.7. Classification of hardness is: soft, less than 5 parts per 100,000; moderately soft, 5 to 10 parts; slightly hard, 10 to 15 parts; moderately hard, 15 to 20; hard, 20 to 30; very hard, over 30.

When hardness is reduced by boiling, the portion which has disappeared is called "temporary" hardness and is due to the carbonates of calcium and magnesium which have been thrown out of solution by the loss of carbonic acid. What remains is "permanent" hardness, due to the presence of sulphates of calcium and magnesium, but occasionally to chlorides and nitrates as well. The disadvantages of hard water are soap wastage; the production of slime in wash-basins, baths, and on textiles being laundered; the formation of scale or fur in boilers, hot water pipes, and kettles.

The condition of foods is improved by cooking in soft water. Personal washing and domestic cleansing are much more efficient and less laborious with soft water. Water of hardness exceeding 20 parts per 100,000 should be softened. Water having hardness of 10 grains per gallon will destroy 17.5 oz. of soap per 100 gallons; a saving of about 17 oz. of soap per 100 gallons of water will result from halving the hardness of 20 grains per gallon. Softening is accomplished either by the removal of calcium and magnesium salts or by their conversion into the corresponding salts of sodium; *i.e.* by precipitation or base exchange. See Water Softening.

Hardoi. District and town of Lucknow division, Uttar Union, India. The district, area 2,323 sq. m., is fairly level, and is watered by the Ganges, Gumti, Ramganga, Gavia, and other streams, and there are several lakes. Dense jungle prevails in parts, inhabited by large game, but the tiger is almost extinct. The chief products are rice and wheat. Hardoi town is 65 m. N.W. of Lucknow, with which it is linked by rly. Pop. (1951) district, 1,361,562: town 29,881.

Hardouin, JEAN (1646-1729). French scholar. He was born at Quimper, became a Jesuit, and in 1683 was appointed librarian at the Collège de Louis le Grand, Paris. He maintained that most of the classic literature of Greece and Rome was the invention of 13th century monks. The exceptions which he admitted were Homer's *Iliad*, Herodotus, Virgil's *Georgics*, Pliny's *Natural History*, the *Satires* and *Epistles* of Horace, and the works of Cicero. In the same way he dismissed all ancient works of art as spurious, and held similarly heterodox views as to the *Septuagint*, the Greek text of the N.T., and the authenticity of all councils of the Church earlier than that of Trent, 1545-63.

Hardt. Mt. range of Rhineland-Palatinate, West Germany. It is a continuation of the Vosges and runs parallel to the Rhine through the Palatinate. The highest summit is Kalmit, 2,250 ft. The upper parts are mainly covered with trees, while the vine is grown on the lower. The E. side, which slopes down to the Rhine, is charmingly picturesque.

Hard Times. Charles Dickens's ninth and shortest novel. Published in *Household Words* (April-Aug., 1854), it is a satire on the utilitarian philosophy of mid-Victorian days, bears unmistakable

evidence of Carlylean influence, was approved as to its main drift and purpose by Ruskin, and dismissed by Macaulay as "sullen Socialism." The utilitarian viewpoint is personified in Thomas Gradgrind, the most memorable character.

Hardwar. Town of the Uttar Union, India, in Saharanpur district. At a height above sea level of 1,024 ft., it is on the right bank of the Ganges. Originally called Kapila, it is a town of great antiquity (sacked by Tamerlane in 1399), but its modern name (Door of Hari or Vishnu) dates from 1400. Among the holy places of Hinduism, its temples are visited by pilgrims from all over India. The chief is that of Dakshewara (Siva) with bathing ghat where every twelfth year the Kumbhmela festival is held; elaborate railway, lighting, sanitary, and police arrangements are needed, as the pop. for the period rises to about a million. The Ganges canal system begins at Hardwar, the Bhimgoda headworks containing a weir 2,000 ft. long which can pass a flood of 445,000 cu. ft. per sec. over the crest. Pop. (1951) 56,175.

Hardware. Term used for ware made of the cheaper metals, *e.g.* iron, zinc, etc., especially kitchen utensils, tools, and the like. In England hardware is manufactured mainly in the Birmingham district.

Hardwicke, PHILIP YORKE, 1ST EARL OF (1690-1764). British lawyer. Born at Dover, Dec. 1, 1690. After education at a private school



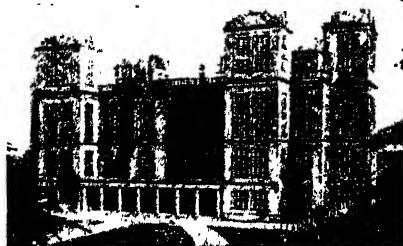
1st Earl of Hardwicke,
British lawyer

he entered an attorney's office, but turned to the other branch of the profession, and after serving as a tutor to the sons of the earl of Macclesfield was called to the bar in 1718. His friendship with Macclesfield, the lord chancellor, was useful, and he soon had a good practice. In 1719 M.P. for Lewes, and in 1720 solicitor-general and a knight, in 1723 he became attorney-general.

In 1733 Yorke was made lord chief justice and created a peer, and in 1737 lord chancellor. In this office he remained until 1756, one of the most influential men in the country. As head of the council of regency in 1745, he had to deal with the crisis caused by the Jacobite rising, and showed himself merciless to the rebels. He

carried the measure abolishing the hereditary jurisdiction in the Highlands, but his name is more closely associated with the Marriage Act of 1753. In 1754 he was made an earl.

Hardwicke spent 1757-62 in the cabinet, although without a definite post. Until his death.



Hardwick Hall. Long one of the seats of the dukes of Devonshire, it became national property in 1957

March 6, 1764, he was one of the leaders of his party in opposition to the ministry of Bute. His eldest son succeeded to his titles; another son, Charles Yorke, became lord chancellor; others were Joseph Yorke, created Lord Dover, and James Yorke, bishop of Ely. Hardwicke's fame rests upon his work as a judge. To him, more perhaps than to anyone else, are due the lines upon which English equity has developed.

Hardwicke, SIR CEDRIC WEBSTER (b. 1893). British actor. Born at Stourbridge, Feb. 19, 1893, he was educated at Bridgnorth, and intended for the medical profession. He studied, however, at the R.A.D.A., played a small part at the Lyceum Theatre, 1912, and toured with Benson in S. Africa. He was the last British officer to leave the war zone in France in 1922. From the Birmingham repertory company he came to London in Back to Methuselah, 1924. He gave outstanding performances in *The Farmer's Wife*; *The Apple Cart*; *The Barretts of Wimpole Street*; *The Late Christopher Bean*; and played leads at the Malvern festivals, 1929-32. Entering films in 1931, he is remembered for *Rome Express*; *Tudor Rose*; *Stanley and Livingstone*; *The Moon is Down*; *Nicholas Nickleby*. He was knighted in 1934.

Hardwicke Society. Legal debating society established about 1835 and named after Lord Chancellor Hardwicke. Its meeting-places have included Peele's Coffee House, Fetter Lane (now a tavern), Anderson's Hotel, the Portugal and Dick's hotels (now no more), and the Temple. Its present meeting-place is the Temple Restaurant.

Originally formed for the discussion of legal subjects, the society now concerns itself mainly with political subjects. Only bar students and barristers are admitted.

Hardwick Hall. English mansion, long a seat of the dukes of Devonshire. It is 6 m. S.E. of Chesterfield, in Derbyshire. Built by Elizabeth, countess of Shrewsbury, 1590-97, it is remarkable for the number and size of its glass windows, and it contains some good pictures and tapestries. It has been altered very little and is a fine example of an Elizabethan mansion. Notable features are the picture gallery and the chapel.

In 1957 the mansion was accepted by the Treasury in part payment of duties arising from the death in 1950 of the 10th duke of Devonshire, and placed in the care of the National Trust.

Hardwood. Term used for a timber that is heavy and close-grained and therefore strong. The opposite term is soft wood. In forestry the term is used for the wood of a broad-leaved tree, such as the beech, in opposition to that of a coniferous tree; this is irrespective of the strength of the timber. See *Forestry*; *Timber*.

Hardy. Smith's tool for cutting or shaping iron and steel. It is made of tool steel and is formed with a squared shank to fit in a socket of the anvil. The upper portion, rising above the anvil, is shaped to a blunt wedge, resembling a chisel; the angle of acuteness varies according to whether the

tool is to be used on heated or on cold metal. Work to be cut is held over the hardy, resting on the sharp edge, and is struck with a hammer to sever it. See *Forging*.

Hardy. A British warship. Leader of the second destroyer flotilla, she was an Admiralty type flotilla leader with a displacement of 1,505 tons, main armament of 4-7-in. guns, and wartime complement of 200 men. On April 10, 1940, she led four destroyers into Ofot Fiord at Narvik, Norway, where German naval forces had concentrated. Entering the harbour alone, the flotilla leader fired at a German destroyer, engaged other warships, and received considerable damage. The commander of the British force, Capt. Warburton-Lee, was mortally wounded (posthumously awarded the V.C.), and the Hardy was run ashore after sinking one destroyer, setting three ablaze, and accounting for seven merchant vessels.

Hardy, ALEXANDER (c. 1560-c. 1631). French dramatist. He was born in Paris, but little is known of his life beyond the fact that for some time he travelled with a band of strolling players, for whom he wrote pieces, and later was attached in a similar capacity to the Théâtre de l'Hôtel d'Argent, Paris. He was one of the most prolific dramatists of history, producing some 600 plays, of which 41 are extant. Among these are *Scélérats*, 1604; *Alphée*, a pastoral, 1608; *La Mort d'Achille*, 1607; and the two best, *Marianne*, 1610, and *Frédégonde*, 1621. Although now little read, Hardy was the first to give life and movement to the classic drama.

THOMAS HARDY: NOVELIST AND POET

George Sampson, M.A., Author and Critic

The articles English Language & Literature and Novel may be consulted in connexion with the following. See also Bournemouth; Dorchester; Dorset; and under the titles of Hardy's better known works, e.g. Dynasts, The Tess of the D'Urbervilles, etc.

Thomas Hardy was born at Upper Bockhampton, near Dorchester, June 2, 1840. From local schools he passed to King's College, London. During 1856-61 he was the pupil of an ecclesiastical architect, and in 1862-67 worked at Gothic architecture under Sir A. Blomfield. It is not fanciful to trace the influence of this training in the ordering of his literary work.

He drew and measured old country churches, since pulled down or destroyed by "restoration," and was a prizeman of the R.I.B.A. and the Architectural

Association. Meanwhile he read Latin and Greek with a fellow pupil and wrote a great deal of verse. Some of this was published, some turned into prose and embodied in novels.

His first known appearance in print was with an article, *How I Built Myself a House*, in *Chambers's Journal* for March 18, 1865. In 1871 appeared his first novel, *Desperate Remedies*, followed in 1872 by *Under the Greenwood Tree*. His last full-length story was *The Well-Beloved*, 1897. Hardy's work, while various in value, has

remarkable homogeneity, due partly to the literary patriotism, or "localism," that confines his scenes and persons to the limits of a province, but most of all to the character of a writer strong and unglamoured in his view of man and the universe, fearless and unflinching in his artistic sincerity.

What distinguishes him definitely from the purely Victorian writers is his complete abjuration of the popular sentimental attitude towards love, life, and religion, and his almost pagan sense of fate. The difference can be seen by a comparison of the two dairymaids, Hetty Sorrel, in *Adam Bede*, and Tess in *Tess of the D'Urbervilles*. Hardy seems to see human life as something almost pitifully transient against the eternal impassivity of nature. Thus, in *The Return of the Native*, 1878, the most powerful creation is not a person, but a place, Egdon Heath, grim, sinister, and almost malignant in its immemorial indifference to the life that flutters briefly on its ancient bosom.

Hardy's artistic geography must not be taken too literally. It is not for nothing that he reverts to the ancient name Wessex, calls Dorchester Casterbridge, Oxford Christminster, and so forth. He is often treated as the exploiter of a province; but his Wessex is a creation rather than a transcript.

Hardy's output of work was very regular—seventeen long novels or collections of stories in twenty-six years, all at a very high level of imaginative and technical excellence. Every reader will have preferences; but general agreement would group together *Tess of the D'Urbervilles*, *Jude the Obscure*, *The Mayor of Casterbridge*, *The Return of the Native*, *The Woodlanders*, and *Far from the Madding Crowd*, as superior to *Desperate Remedies*, *A Pair of Blue Eyes*, *The Hand of Ethelberta*, and *A Laodicean*. Never overlooked, Hardy became most famous when *Tess of the D'Urbervilles*, with its challenge to the conventions of respectability, appeared in 1891, and something like a storm burst when the grim and dreadful picture of sordid existence, called *Jude the Obscure*, followed a few years later. *The Well-Beloved* (1897), a puzzling fantasy, seemed to indicate a loss of power.

The unwavering views of Hardy's novels find their parallel in the poems. Verse was his earliest literary activity and his latest. What followed *The Well-Beloved* was not another novel, but *Wessex Poems* (1898), including some dating from his activity in



Thomas Hardy.

Russell

the 'sixties. Several other volumes of verse, e.g. *Poems of the Past and the Present*, *Time's Laughing-Stocks*, *Satires of Circumstance*, *Moments of Vision*, succeeded.

The poems display the homogeneity of the stories. Many of them, the poet is careful to tell us, are

Abbois Cernel, Cerne Abbas; *Aldricrickham*, Reading; *Alfredston*, Wallage; *Anglebury*, Wareham; *Buckbury Fitzprians*, Okeford Fitzpaine; *Budmouth Regis*, Weymouth; *Casterbridge*, Dorchester; *Castle Boterel*, Bosccastle; *Chalk Newton*, Maiden Newton; *Chasetown*, Cranborne; *Chine Manor*, Canford Magna; *Christminster*, Oxford; *Corvesgate Castle*, Corfe Castle; *Downstaple*, Barnstaple; *Durnover*, Fordington; *East Egdon*, Affpuddle; *Emminster*, Beamminster; *Endelstow*, St. Juliot's; *Enkwoorth*, Enkcombe; *Evershead*, Evershot; *Falls Park*, Mells; *Flintcomb Ash*, Dole's Ash; *Great Hintock*, Minterne Magna; *Havenpool*, Poole; *Holmstoke*, East Stoke; *Ivell*, Yeovil; *Kingsbere*, Bere Regis; *King's Hinton Court*, Melbury Sampford; *Knollingwood*, Wimborne St. Giles; *Knollsea*, Swanage; *Leldanton*, Gillingham; *Little Hintock*, Melbury Osmund; *Lornton*, Horton; *Lulshead*, Lulworth; *Marlott*, Marnhull; *Marygreen*, Fawley Magna; *Melchester*, Salisbury; *Middleton Abbey*, Milton Abbey; *Millpond St. Jude's*, Milborne St. Andrews; *Narrobourn*, East Coker; *Nuzzlebury*, Hazlebury Bryan; *Overcombe*, Sutton Poyntz; *Port Bredy*, Bridport; *Posham*, Portisham; *Quartershot*, Aldershot; *Ringworth*, Ringstead; *Sandbourne*, Bournemouth; *Shaston*, Shaftesbury; *Sherton Abbas*, Sherborne; *Shottesford Forum*, Blandford Forum; *Solentsea*, Southsea; *Stancy Castle*, Dunster; *Stickleford*, Tincleton; *Stoke Barehills*, Basingstoke; *Stourcastle*, Sturminster Newton; *Talbothays*, Norris Mill Farm; *Tolchurh*, Tolpuddle; *Toneborough*, Taunton; *Warborne*, Wimborne; *Weatherbury*, Puddletown; *Wellbridge*, Woolbridge; *Weydon Priors*, Weyhill; *Wintoncester*, Winchester; *Yewsholt*, Farns.

Thomas Hardy. Place-names in the Wessex novels, with their generally accepted identifications. The fictitious names are printed in *italics*.

"dramatic or personative in conception," that is, utterances of invented persons, and not necessarily his own. But it is impossible not to find in them the strong, sad sincerity, occasional bitterness, and tragic recognition of life's futility that form a kind of ground bass to the novels. Hardy's poems, it should be added, are original in manner, and but lightly touched with verbal grace and felicity; but he is a genuine poet; the lyric inspiration of his verse is unquestionable. It is not impossible that the poet may survive the story-teller.

The suspicion of exhausted power aroused by *The Well-Beloved* was removed when the most amazing of his works, *The Dynasts*, an epic-drama of the Napoleonic Wars, began to appear in 1904. Two further instalments came in 1906 and 1908. It is a pity that the work did not first appear as a completed thing, for the vastness of the design and the mastery of execution could not be appreciated in a periodical reading of parts coming at intervals of two years. The unique greatness of *The Dynasts* is generally admitted. Hardy's implied view of man as a puny, temporary creature, fretting himself briefly against a spectral background of remote and inexorable forces, here becomes explicit, for the events of the conflict are shown first in the dimensions of man's own experience, and then as the faint writhings of ant-like creatures on little plots of earth, watched from above, interpreted by all-seeing spiritual powers.

As poetry, drama, and history, *The Dynasts* is a noble contribution to world-literature, and a great life work is thus fully rounded off by a great achievement.

Thomas Hardy was given the Order of Merit in 1910. He received the degrees of LL.D. (Aberdeen), Litt.D. (Cambridge), Litt.D. (Oxford), and became an Honorary Fellow of Magdalene College, Cambridge. He was twice married, first, in 1874, to Emma Lavinia Gifford, and next, in 1914, to Florence Emily Dugdale. He died at his Dorchester home, Max Gate, Jan. 11, 1928. His body was cremated and his ashes buried in Poet's Corner, Westminster Abbey, and his heart was buried in Stinsford churchyard, not far from Dorchester.

Published Works. *Desperate Remedies*, 1871; *Under the Greenwood Tree*, 1872; *A Pair of Blue Eyes*, 1873; *Far from the Madding Crowd*, 1874; *The Hand of Ethelberta*, 1876; *The Return of the Native*, 1878; *The Trumpet-Major*, 1880; *A Laodicean*, 1881; *Two on a Tower*,

1882; The Mayor of Casterbridge, 1886; The Woodlanders, 1887; Wessex Tales, 1888; A Group of Noble Dames, 1891; Tess of the D'Urbervilles, 1891; Life's Little Ironies, 1894; Jude the Obscure, 1896; The Well-Beloved, 1897; Wessex Poems, 1898; Poems of the Past and Present, 1902; The Dynasts, I, 1904; II, 1906; III, 1908; Time's Laughing-Stocks, 1909; A Changed Man, 1913; Satires of Circumstance, 1914; Moments of Vision, 1917; Late Lyrics and Earlier, 1922; The Famous Tragedy of the Queen of Cornwall, 1923; Human Shows, 1925; Yuletide and a Younger World, 1927; Winter Words, 1928; The Play of S. George, 1928.

Bibliography. The Art of T. H., Lionel Johnson, 1895; The Hardy Country, C. G. Harper, 1904; Critical Study, L. Abercrombie, 1912; Papers, W. Sharp, 1912; T.H.'s Wessex, H. Lea, 1913; Thomas Hardy, H. Child, 1916; Life, Florence Hardy (widow), 1933; Hardy of Wessex, C. J. Weber, 1941; Thomas Hardy, E. Blunden, 1942; Hardy the Novelist, Lord David Cecil, 1943.

Hardy, THOMAS BUSH (1842-97). British painter. Born at Sheffield, he was an extraordinarily prolific painter of marine subjects, chiefly in water-colour. He exhibited at the Royal Academy from 1872, and became a member of the Royal Society of British Artists in 1884. He died Dec. 15, 1897.

Hardy, SIR THOMAS MASTERMAN (1769-1839). British sailor. Born at Kingston, Dorset, April 5,



1769, he served in the merchant service before he was appointed lieutenant in the navy in 1793 and was attached to Nelson's squadron off Genoa. In 1796 he served under Nelson in the Minerva. In 1798 he was present at the battle of the Nile, and was promoted to Nelson's flagship, the Vanguard.

In command of the Victory in 1805, he acted as captain of the fleet. He was by Nelson's side when the admiral was struck, was witness to his will, and attended him until his death. Made a baronet in 1806, Hardy was sent to the N. American station, where, except for three years (1809-12) at Lisbon, he remained until 1815.

In 1819 he was made commander-in-chief of the S. America station. In 1825 he was promoted



Thomas Hardy's house, Max Gate, at Dorchester, where he lived in later life, and died

rear-admiral, and in 1830 became first sea lord. Governor of Greenwich Hospital from 1834, he died Sept. 20, 1839. A memorial obelisk surmounts a hill S. of Dorchester. See Nelson; consult Nelson's Hardy: his Life, Letters and Friends, A. M. Broadley and R. G. Bartelot, 1909; Nelson's Hardy and his Wife, J. Gore, 1935.

Hardyng, JOHN (1378-1465). English chronicler. A native of Northumberland, he became a soldier. He saw a good deal of service in France, being at Agincourt, and he was sent on an errand to Rome. He passed much of his time in compiling a rhyming chronicle of England. The first edition ended in 1436; another, Yorkist in its tone, was prepared by him for Richard, duke of York, and yet another for Edward IV; it is inaccurate and dull. Hardyng lived from about 1436 at Kyme, Lincs.

Hare (*Lepus*). Name applied generally to a genus of rodents. There are several well-marked local races or varieties, the majority grey or brown. They are all remarkable for their long hind legs and ears, and their short curved tails, and are capable of great speed. The common hare (*L. europaeus*) is distinguished from the rabbit by its larger size, longer limbs and ears, and the reddish-brown hue of its fur. It also differs greatly in its habits, especially in not living in burrows.

The hare lives usually in the open, crouching in a furrow or in a hollow in the grass, which is called a form, and takes shelter in thickets only in wet weather. It sits so very deep that often it will not stir until almost trodden upon. The hare feeds mainly

on corn, vegetables, and bark of young trees.

Hare, SIR JOHN (1844-1921). British comedian and actor-manager. Born in London, May 16, 1844, and educated at Giggleswick grammar school, in 1865 he made his earlier appearances in London in the leading parts of Robertson's comedies. From 1875 he was manager of the old Court Theatre, and from 1879 to 1888 was associated with Kendal as manager of the St. James's Theatre. During 1889-95 he was lessee of the Garrick. He brought out, and played in, many of Pinero's plays from The Money Spinner, 1881, to The Gay Lord Quex, 1899. One of his most popular parts was Benjamin Goldfinch in A Pair of Spectacles, 1890. Popular also in America, he was knighted in 1907, last appeared in 1917, and died Dec. 28, 1921.

Hare, J. ROBERTSON (b. 1891). British comedian. Born in London, Dec. 17, 1891, he took his first speaking part on the West End stage in The Scarlet Band, 1913. His reputation was made as the butt to Ralph Lynn and Tom Walls in the Aldwych farces from 1924 to 1933, e.g. A Cuckoo in the Nest, but he gained fresh popularity as a star with Alfred Drayton in Aren't Men Beasts? 1936, and A Spot of Bother, 1937, when he played the timid, harassed little man with pompous utterance. Later farces included One Wild Oat, 1948. He entered films in 1929, and appeared in screen versions of Aldwych farces.

Hare, WILLIAM. Scottish murderer, notorious for his connexion with William Burke. See Burke and Hare.

Hare and Hounds. Variation of crow-country running. It is a healthy form of winter exercise in



John Hare
Foulsham a standish



J. Robertson Hare,
British comedian



Hare. The common red-brown hare, *Lepus europaeus*
Chas. Reid

which generally one or two, but sometimes more, of the fleetest runners participating are selected as the hares, the remainder, unlimited in number, being the hounds. The hares set off at a fast pace laying a trail of paper-cuttings as they go, and the pack, who follow at an interval of about ten minutes, endeavour to overtake them. By adroitly doubling and laying cross-trails the hares endeavour to avoid capture. See Running.

Harebell (*Campanula rotundifolia*). Perennial herb of the family Campanulaceae. It is a



Harebell, flowers and buds

native of Europe, N. Africa, N. Asia, and N. America. Near the rootstock the leaves are heart-shaped or kidney-shaped, but up the stem become more slender and elongated. The stems are slender, angled, with blue bell-shaped flowers. See Bell-flower; Flower.

Harefield. Parish and village of Middlesex, England. Situated above the Colne, between Uxbridge and Rickmansworth, it has asbestos and lime works. The manor, in Edward the Confessor's time the property of Countess Goda, passed in 1284 to the Bache-worths, in 1315 to the Swanlands, and then to Sir John Newdegate, whose descendant sold it in 1585; it returned to the Newdegates in 1675.

Lord Keeper Egerton, who married Alice Spencer, dowager countess of Derby, acquired it in 1601, and at Harefield Place entertained Queen Elizabeth in 1602, when, says tradition, Othello was performed. Milton's Arcades was performed here for the countess (d. 1637) in 1634. The mansion, which has had two successors, was burnt in 1660. The church of S. Mary, founded 1300, is rich in monuments.

Hare-lip. Congenital deformity in which the upper lip is fissured. Usually there is a central fissure in the margin of the lip. The defect may involve the nose and the hard and soft palates; this reflects failure in fusion of the parts of the embryo. Hare-lip can be dealt with in infancy by plastic surgery.

Harem (Ar. *hareem*, sacred, set apart, i.e., forbidden). Name ap-

plied in Mahomedan countries to that part of the house in which the women are secluded. The meaning of the word has been extended to include all the women thus kept apart. Although the harem is a Mahomedan institution, the custom of secluding the female members of the household is of great antiquity in the East; excavations prove that the kings of ancient Persia confined their womenfolk to a separate part of the palace, while various passages in the O.T. provide evidence to the same effect.

According to the Koran, no woman may allow her face to be seen by any man save her father, husband, son, or close blood relations, and obedience to this precept, together with the practice of polygamy and concubinage, led to special apartments or entire wings of large houses being devoted to the women of the establishment. Conditions of life in the harem differ widely in Mahomedan countries. The law of Islam permits a man four wives (the sultan is allowed seven), and each wife may demand a separate apartment.

In India and Turkey the inmates had more liberty than elsewhere, and the rule of the eunuchs, in whose charge the harems were frequently placed, was less evil.



Hare's-foot Fern. Rootstock and wedge-shaped fronds

Idleness and scandalmongering are the worst features of the system. Western ideas have gradually had their effect on the harem, and the institution, in more westernised parts of Islam, has virtually disappeared. *Pron.* hair-em.

Haren, ONNO ZWIER VAN (1711-79). Dutch poet and statesman. Brother of Willem van Haren, he was born at Leeuwarden on April 2, 1711, and occupied various offices of state in the Netherlands, being a staunch supporter of the Orange family. He wrote much verse, among his most notable volumes being *Die Koophandel*,

1769; *Agon*, a poetic tragedy, 1769; *De Geusen*, 1771; *De Vrijheid*, 1778. He translated Pope's *Essay on Man*. He died Sept. 2, 1779.

Haren, WILLEM VAN (1710-68). A Dutch poet. Born of a distinguished family at Leeuwarden, Feb. 21, 1710, Haren studied at Franeker and Groningen. In 1728 he inherited the castle and estates of Henkenshage. His best work was the epic poem *Gevallen van Friso*, 1741, one of the notable long poems in the language. He died July 4, 1768.



Hare's-ear, leaves and flower-head of *B. fruticosum*

Hares. North American Indian tribe of Athapascan stock; properly the Kawchodinné, or great-hare-people. Living N. and W. of the Great Bear Lake, Canada, they number about 600. They subsist on fish, reindeer, and the Arctic hare, which also furnishes their clothing.

Hare's-ear (*Bupleurum rotundifolium*). Annual herb, belonging to the family Umbelliferae, native of Europe and W. Asia. The stem is hollow, appearing to run through the base of the thick, oblong or roundish, glaucous leaves. The minute yellow flowers form tiny umbels in the centre of a cup of bracts whose edges are united. A shrubby perennial (*B. fruticosum*), from Spain, is grown in gardens.

Hare's-foot Fern (*Davallia canariensis*). A fern belonging to the Polypodiaceae, native of W. Europe and the Canaries. The rootstock creeps above ground, densely clothed with shaggy brown scales; the frond is wedge-shaped, cut up into much divided leaflets (pinnae).

Hare's - tail Grass (*Lagurus ovatus*). Annual grass, member



Hare's-tail grass, so called from the flower head

of the family Gramineae. It is a native of W. and S. Europe, N. Africa, and W. Asia. It has numerous stems, broad, flat leaves, and flower spikelets crowded into a white, hairy oval head, which suggested the name.

Harewood, EARL OF. British title borne since 1812 by the family of Lascelles. Edward Lascelles, the head of a well-known Yorkshire family, was created Baron Harewood in 1796, an earlier creation of this name having become extinct when its first holder died. In 1812 he was made an earl. Princess Mary, daughter of George V, became a countess of Harewood, marrying the 6th earl (v.i.) in 1922. The family estates are in Yorkshire (W.R.), the chief seat being Harewood House, near Leeds, and an eldest son is known as Viscount Lascelles. *Prom. Har-wood.*

Harewood, HENRY GEORGE CHARLES LASCELLES, 6TH EARL OF (1882-1947). British peer. He was born Sept. 9, 1882, and educated at Eton and Sandhurst. A.D.C. to the governor-general of Canada 1907-11, he served with the Grenadier Guards in the First Great War. By the death in 1916 of the last marquess of Clanricarde, brother of his grandmother, he inherited an estate of £2,500,000. On



Feb. 28, 1922, 6th Earl of Harewood as Viscount Lascelles, he married Princess Mary, daughter of George V. He succeeded his father as 6th earl in 1929. Lord-lieut. of the W. Riding from 1927, he was personal A.D.C. to George VI, was created K.G. in 1922, and G.C.V.O. in 1934. A prominent freemason, he was grand master of the united grand lodge of England from 1943. He died May 24, 1947.

His elder son, George Henry Hubert Lascelles, born Feb. 7, 1923, and educated at Eton, succeeded as 7th earl. He was taken prisoner in 1944 by the Germans. Liberated in 1945, he was appointed A.D.C. to the earl of Athlone. He then went to King's College, Cambridge. Having developed by study during his imprisonment a natural love of music, he became music critic for *The New Statesman* and founder-editor of *Opera*. He married in 1949 Marion Stein, an Austrian-born pianist. His brother Gerald David was born Aug. 21, 1924.

Harfleur. Town and seaport of France. In the dept. of Seine-Maritime, it stands on the Lé-



Harfleur, France. The church of St. Martin, with its Gothic spire

zarde, near where it falls into the Seine, just E. of Havre. The chief building is St. Martin's church, a Gothic building known for its high steeple and fine portal. There are ruins of the old castle, but the other fortifications have disappeared. A 17th-century château occupies the castle site. Pop. (1954) 7,495.

Harfleur was a port in the Middle Ages, but later it was rendered useless by the accumulation of sand in the Lézarde. In 1887 a canal was cut connecting it again with Havre and the Seine. A new harbour, docks, and other accommodation for vessels and their cargoes were built along the canal, and the port has a trade in coal and timber. There is some fishing, while other industries are connected with oil and spirits. Harfleur was besieged and taken by Henry V of England in 1415, being then the chief port of Normandy. In 1445, inspired by John de Grouchy, the French drove out the English, who returned, but lost the place finally in 1449.

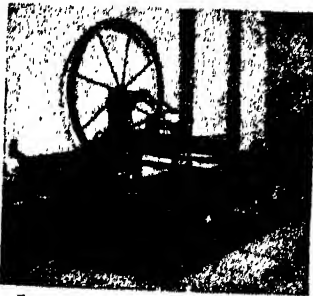
Hargeisa. Town of British Somaliland. Situated in the S.W. of the territory, 120 m. by road S.W. of Berbera, it is an important station on the trade route to Abyssinia. Rice and dates are cultivated, and there is some stock farming. The town was captured by Italian troops, Aug. 4, 1940, and retaken by a British force, March 20, 1941. Pop. (est.) 35,000.

Hargood, SIR WILLIAM (1762-1839). British admiral. Born May 6, 1762, he entered the navy in 1773. As a youth he saw a good

deal of active service, especially during the war against America. In 1792 he obtained command of a ship, the *Hyacra*, but in 1793 this was taken by a French vessel, and the officers were made prisoners. They escaped and soon Hargood, acquitted by a court-martial, was commanding another ship. He did good service in suppressing the mutiny of 1796; at Trafalgar he led the *Belleisle*; and he was almost constantly at sea until 1814, being appointed to command a squadron in 1810. In 1815 he was knighted, in 1831 was made an admiral, and during 1833-36 was commander-in-chief at Plymouth. Hargood, who died Sept. 11, 1839, owed much to his friendship with William IV, under whom he served in the navy.

Hargreaves, JAMES (d. 1778). British inventor. A carpenter and weaver of Standhill, near Blackburn, in 1760 he invented an improvement of the carding machine, and about four years later built a machine which contained eight spindles in a row. This was called (after his wife) the spinning jenny, and its invention marks the beginning of an era in industrial history. Together with Kay's flying shuttle it revolutionised the cotton and woollen industries, multiplying their output many times.

Imagining that its introduction would replace human labour by



James Hargreaves. Model of his Spinning Jenny, now in the Science Museum, South Kensington

machinery and thus mean ruin for themselves, some Blackburn spinners raided Hargreaves' house and destroyed his apparatus in 1768. He thereupon moved to Nottingham, and, notwithstanding opposition his machines were soon widely used. After his death it was asserted that he had appropriated the invention of Arkwright, and the matter was the subject of a lawsuit. *See Arkwright; Spinning.*

Haricot, FRENCH BEAN, OR KIDNEY BEAN. Seed of *Phaseolus vulgaris*. The green pods, called by

the French *haricots verts*, when boiled form a wholesome and excellent vegetable. They can be preserved in salt for some time for winter use. The beans, either dried or fresh, are boiled. If dried, it is necessary to soak them in cold water for about 24 hours, or they may be placed in cold water and brought to the boil. After simmering half an hour they are again placed in cold water, and this process is repeated till the beans are tender. The older meaning of the French word *haricot* is a dish of stewed mutton, beans, and other vegetables. *Pron.* harryko. See Bean.

Häring, GEORG WILHELM HEINRICH (1798–1871). German novelist, who wrote also as Willibald Alexis. Born at Breslau, June 29, 1798, he saw some military service, was engaged in law, and then took up literary work. He was a prolific writer of poems, plays, and historical novels, many of the last having become classics. *Cabanis*, 1832; *Roland von Berlin*, 1840; *Die Hosen des Herrn von Bredow*, 1846–48, are the best known of his romances. He was much influenced by Sir Walter Scott, and his early novels, *Walladmor*, 1823–24, and *Schloss Avalon*, 1827, were long considered works of that author. Häring died at Arnstadt, Dec. 16, 1871.

Harington, SIR CHARLES HARRINGTON (1872–1940). A British soldier. Born at Chichester, May 31, 1872, he was educated at Cheltenham and Sandhurst, entering the army in 1892. He served in the S. African War, and during the First Great War was on Gen. Plumer's staff in Italy. Deputy chief of the imperial general staff, 1918, he commanded the army of the Black Sea, 1920. His tact helped to mitigate the humiliation of the Chanak incident. He held the Northern Command, 1923, Western Command in India, 1927–31, and was governor and c.-in-c. Gibraltar, 1933–38. Harington was knighted in 1919 and died Oct. 22, 1940.

Harington, JAMES. The author of *Oceana* is also spelt Harrington and so described in this work.

Harington, SIR JOHN (1561–1612). English writer. He was born at Kelston, Somerset, and Queen Elizabeth became his godmother, his parents having suffered imprisonment for their loyalty to her in 1554. He was educated at Eton and Cambridge and studied law at Lincoln's Inn. His wit and liveliness made him a favourite at court. In 1591 he

published a translation of Ariosto's *Orlando Furioso* with a prefatory *Apologie of Poetrie*. Later he issued satires of a somewhat free character, especially *The Metamorphosis of Ajax*, 1596, in imitation of *Rabelais*, which aroused the queen's anger. Having been forgiven, he went to Ireland in 1599 with Essex, by whom he was knighted.

When the queen was nearing her end, he wrote *A Tract on the Succession to the Crown*, in favour of James of Scotland (publ. 1880), and in 1605, with a view to becoming chancellor of Ireland, he wrote *A Short View of the State of Ireland* (publ. 1879). He died at Kelston, Nov. 20, 1612. His letters and miscellanies, brought together in *Nugae Antiquae*, 1769, throw much light on Elizabethan times.

Hariri, ABU MOHAMMED AL-QASIM AL (1054–1122). Arabic grammarian and poet. He was born and died at Basra on the Tigris. Author of several grammatical treatises, of which two are extant, his most famous work is his *Maqāmāt* (*Assemblies or Lectures*), a collection of 50 rhymed tales. The hero of them is Abu Seid, a disreputable but fascinating scamp. There are Eng. trans. by T. Preston, 1850, T. Chenery, 1867.

Hari Rud or **HARI RUD**. River of Afghanistan, the ancient Arius. Rising in the Hindu Kush, it has a length of about 700 m. It flows W. through Afghanistan, then turns N. to form for part of its course the boundary between Afghanistan and Persia. Herat is situated on the river, which finally loses itself in the Tejen swamps of the Turkmen S.S.R.

Harker, GORDON (b. 1885). British actor. Born in London, Aug. 7, 1885, he was educated at Ramsey grammar school, and made his first appearance on

the London stage in 1903. Working with Oscar Asche, he became famous as an interpreter of Cockney characters. His best-known performances were in thrillers

by Edgar Wallace and others: *The Ringer* (1926), *The Calendar*, *The Case of the Frightened Lady*, *The Frog*, *Saloon Bar*; but he could be quietly effective as a suburban type, e.g. in *Acacia Avenue* (1943). Many of Harker's characterisations were transferred to the screen.

Harkness, MRS. STEPHEN (1837–1926). American philanthropist. She was the wife of an American railway owner, and made many notable charitable gifts. One was the Commonwealth Fund, est. 1918 "to do something for the welfare of mankind." For candidates of British descent a number of fellowships are tenable for two years at certain American universities. The London offices of the fund are at 35, Portman Sq., W.1. Mrs. Harkness died March 27, 1926.

Harland, HENRY (1861–1905). American novelist. Born at St. Petersburg (now Leningrad),

March 1, 1861, he spent most of his later years in London, and died in Italy at San Remo, Dec. 20, 1905. His early books were realistic studies of American Jewish life



Henry Harland,
American novelist

written under the pseudonym of Sidney Luska. He became known in Great Britain as editor of *The Yellow Book* and as author of three volumes of short stories: *Grey Roses*, 1895; *Comedies and Errors*, 1898; *Mademoiselle Miss*, 1903; and of three novels: *The Cardinal's Snuff Box*, 1900; *The Lady Paramount*, 1902; *My Friend Prospero*, 1904. His later work won for him a deserved reputation as a stylist.

Harlaw. Locality in Aberdeenshire, Scotland, famous as "bloody Harlaw" for the encounter here in 1411. It stands near the river Ury, 2 m. N.W. of Inverurie. Donald, lord of the isles, collected his Highlanders to take possession of the earldom of Ross. He was met by troops under the earl of Mar, and his force was completely crushed.

Harlech. Town of Merionethshire, Wales. It lies 10 m. by rly. N. by W. of Barmouth, and is famous for its ruined castle overlooking the sea. There was a fortress here in Roman times, but the present building dates from the reign of Edward I. In 1468 the castle was taken by the Yorkists after a long siege, this incident having, it is said, given rise to the Welsh song of *The March of the*



Sir John Harington
English writer
After J. Thurston

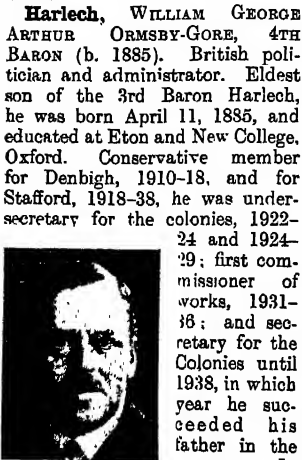


Gordon Harker
British actor

Men of Harlech. It was dismantled after the Civil War, when it was one of the last places to hold out for Charles I. The town has declined in importance. It was made a borough by Edward I, and was long the county town. There is a golf course on the sands.



Harlech. Castle crowning a rock on the coast of Merionethshire.



Lord Harlech, British politician

high commissioner for the U.K. in the Union of S. Africa and high commissioner for Basutoland, Bechuanaland, and Swaziland, resigning in 1944. He was made constable of Carnarvon Castle, 1946, and created K.G., 1948. He wrote *Florentine Sculptors of the 15th Century*, 1930; *Guide to the Mantegna Cartoons at Hampton Court*, 1935.

Harleian Manuscripts. Collection made by Robert Harley, 1st earl of Oxford (1661-1724), and his son Edward (1689-1741). It contained 7,639 volumes of MSS and 14,336 rolls and other deeds. In 1753 it was purchased for £10,000 by the government and placed in the British Museum. See *British Museum, Manuscripts*.

Harlem District of New York City, U.S.A., and a centre of Negro urban population. It lies north of Central Park, between the East and Harlem Rivers. The name dates from the time of the Dutch settlement of New York, then New Amsterdam. Originally a village—a description of it will be found in Washington Irving's *Knickerbocker History*—it became a resi-

dential suburb, remaining in white occupation until there was a mass influx of Negroes from the S. during the First Great War. Its pop. is now about 325,000. Its supposed disorderly night life attracts seekers after sensational entertainment: an undeserved slur, for the bulk of its pop. consists of Negroes of all classes engaged in the decent occupations commonly followed here as elsewhere by white and coloured folk alike.

Harlequin (Ital. *arlecchino*). Stock character in pantomime. The origin of the name is uncertain. According to one explanation, it is a corruption of *Il Lecchino*, the lick of plates, Harlequin having been originally a gluttonous eating-house menial, who abandoned that profession and became first soldier, then comedian, tumbler, dancer, merry-andrew, and mountebank at one and the same time.

Disguised as the marquis of Sbruffadeli, he goes to court and makes love to the court ladies and to their waiting-maids. Columbine (q.v.) is sometimes his mistress, sometimes his wife. "Harlequin... with his black mask, his many-coloured lozenges, his shower of spangles, represents love, wit, mobility, audacity, all the showy and vicious qualities" (T. Gautier). Another suggested derivation is from old Fr. *hellequin*, demon; cf. A.S. *hella cynn*, people of hell. The harlequin of English pantomime is



Harlequin. Representation in ballet of the traditional pantomime character

a mischievous character who plays tricks on the clown and the pantaloons, to whom he is supposed to be invisible, and who engages in acrobatic dances with the columbine. See *Pantomime*; consult also *History of the Harlequinade*, M. Sand, 1915.

Harlequin Duck (*Histrionicus histrionicus*). A species of wild duck, plentiful in the Arctic regions and occasionally visiting Great Britain. It is a handsome bird, the male having lead-coloured plumage, with purple bars on the wings and white markings on the head, neck, and



Harlequin Duck. Specimens of male and female birds

breast. It spends the summer inland, and is found in winter about rocky coasts.

Harlequins. English Rugby football club. It was established in 1871, and soon ranked as one of the chief of those playing around London. Its first ground was at Wandsworth Common. Under A. D. Stoop, an England player 1905-12, the club was very successful, and in 1908 removed its headquarters to Twickenham.

Harlesden. District of Greater London, England. In the borough of Willesden, it lies between Kensal Green and Stonebridge Park, on the Harrow Road. It is served by electric and Bakerloo llys. and has a wharf on the Paddington branch of the Grand Union Canal. Once known as Harlesden Green, it is now built over. The church of All Souls dates from 1879.

Harley Street. London thoroughfare connecting Marylebone Road and Cavendish Square, W. Named after Edward Harley, 2nd earl of Oxford, its notable residents have included Sir Philip Francis, William Beckford, W. E. Gladstone, Sir O. Lyell, A. A. Procter, B. W. Procter, Allan Ramsay, and J. M. W. Turner. Many leading medical specialists and physicians have consulting-rooms here.

Harlingen. Town and seaport of the Netherlands. In the province of Friesland, it stands on the

coast, 16 m. W. of Leeuwarden. It has a large harbour built in 1870-77 and enlarged in the 20th century, and from it are exported butter, cheese, cattle, potatoes, and other products of Friesland, while timber, coal, cotton, and jute are imported. There is regular steamship communication with London, Amsterdam, and other ports. With the interior it is connected by railway and canal, while it has a service of tramways. The town hall and an old church are the chief buildings. It was liberated from the Germans by the 1st Canadian army, April 17, 1945. Pop. (est.) 11,000.

Harlington. See Hayes and Harlington.

Harlow. Market town and urb. dist. of Essex, England, on the river Stort, 20 m. N. of London. Excavations here in 1928 brought to light Roman remains. In 1946 Harlow was scheduled for development as a satellite town of London. The development plan was approved 1947; ten years later about 30,000 (of an intended pop. of 60,000) had been accommodated, with appropriate shopping and industrial development. Harlow was made an urb. dist. in 1955. Market days Tues. and Sat.

Harlow, JEAN (1911-37). An American film actress, born March 3, 1911. From her first screen appearance in *Hell's Angels*, 1930, she was nicknamed the "platinum blonde," and then made a film with that title. Her distinctive looks, her original style, and the tantrums of the characters she played made her a success in *Dinner at Eight*, *China Seas*, *Libelled Lady*, *The Man in Possession*. While *Saratoga*, in which she had a part, was being made, she died, June 7, 1937.

Harman, SIR JOHN (d. 1673). English sailor. Of Suffolk birth, he first appears as commanding the



Sir John Harman,
English sailor
After Lely

Welcome in a battle off Portland in 1653. In 1654 he sailed to the Mediterranean with Blake, under whom he also fought at Santa Cruz. In 1665 he carried the duke of York's flag in the *Royal Charles* in the battle of June 3, when the Dutch were defeated. Knighted for his share in the victory, he was promoted rear-admiral and in 1666

was severely wounded in the battle off North Foreland. In 1667 he went to the West Indies as commander-in-chief and destroyed the French fleet at Martinique. Carrying the campaign ashore, Harman took Cayenne and Surinam. In 1672 he took part in the battle of Sole Bay. Next year he distinguished himself against de Ruyter, sitting, owing to illness, in a chair on the deck while directing operations. He died Oct. 11, 1673.

Harmattan. Dry, dust-laden wind which blows away from the Sahara, between Oct. and March. The harmattan, locally known as the Doctor, brings cool dry weather to the steaming jungles of West Africa, and is health-giving. The fine dust it brings often forms a thick haze.

Harmer, JOHN REGINALD (1857-1944). British divine. Born Aug. 11, 1857, he was educated at Eton and King's College, Cambridge, being elected a fellow of his college in 1883. Ordained in 1884, he later became domestic chaplain to the bishop of Rochester. In 1895 he was made bishop of Adelaide, N.S.W., where his name is associated with the building of the cathedral. He returned to England in 1905 as the bishop of Rochester, resigning in 1930. He advocated reform in church government, and prayer-book revision. He died March 9, 1944.

Harmer, SIR SIDNEY FREDERIC (1862-1950). British scientist. Born at Norwich, March 9, 1862, he was educated at University College, London, of which he became fellow, and at King's College, Cambridge, where he was assistant tutor 1890-1908. He was also super-



Sir Sidney Harmer,
British scientist
Russell

intendent of the university museum of zoology, Cambridge, 1891-1908. From 1919 to 1927 he was director of the natural history departments of the British Museum and keeper of zoology. He was made F.R.S. 1898, becoming vice-president 1922, and was joint editor of *The Cambridge Natural History*. Knighted in 1920, he received the gold medal of the Linnean society, 1934. He pub. many papers on polyzoa and the whales. He died Oct. 22, 1950.

Harmine. Alkaloid which occurs in the seeds of the wild rue (*Peganum harmala*). The seeds

contain about 4 p.c. of alkaloids, one-third of which is harmine, the rest being of harmaline.

Harmodius and Aristogiton. Two devoted Athenian friends. When the sister of Harmodius had been insulted by Hipparchus, brother of the tyrant Hippias, they resolved to murder Hipparchus at the festival of the Panathenaea in 514 B.C. Hipparchus was slain, but Harmodius was killed before Hippias could be reached, and though Aristogiton escaped, he was subsequently taken prisoner. Put to torture, he died without giving any information as to the names of his accomplices. Though the motive of the assassination was to satisfy a private injury, yet the tyranny of Hippias had been so oppressive that Harmodius and Aristogiton were honoured as martyrs by later generations.

Harmonia. In Greek legend, daughter of Arēs and Aphrodītē, and wife of Cadmus. Among her wedding presents were a robe and necklace which brought misfortune on all those who owned them. According to one story, they were the gift of Hephaestus, who desired to avenge her mother's unfaithfulness. See Alcmaeon; Cadmus.

Harmonica. Alternative name for the musical instrument described in this work under musical glasses. The word later came to be used for the special mouth organ (*q.v.*) used by the expert performer.

Harmonic Motion. A term which may be used as the general description of the periodic oscillatory type of motion which is so common in nature, and of which the motions of the tides, the vibrations of a violin string, and the beating of a pendulum are familiar examples. The ideally simple type of harmonic motion is known as "simple harmonic motion," and it has been found possible, by the method known as "harmonic analysis," to resolve every harmonic motion into a combination of different simple harmonic motions.

Simple harmonic motion is defined as follows. If we look at a particle, which is moving uniformly in a circle $Q^1 M Q N$, from a point P some distance outside it (see

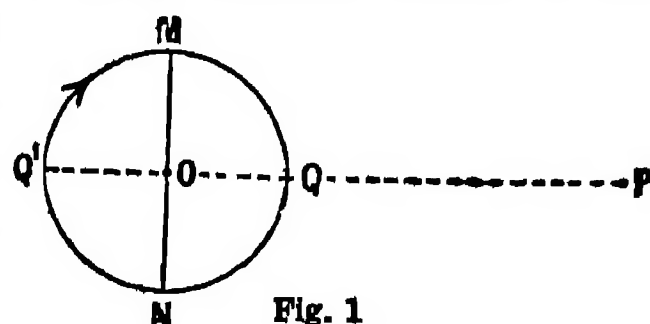
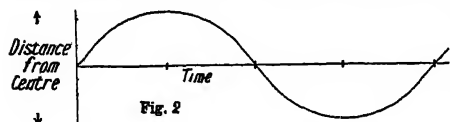


Fig. 1

diagram Fig. 1), the particle will appear to be moving backwards

and forwards along the diameter M O N. While the particle actually moves with uniform speed along the semi-circle N Q¹ M, it will appear to the observer at P to move with increasing speed from N to O, and then with decreasing speed from O to M; its apparent motion is then reversed, and the particle returns to N, again reaching its highest apparent velocity when opposite the centre O. A particle which moves to and fro along a line M O N as the particle considered appears to do, is said to have a simple harmonic motion. The motion of the particle is such that its acceleration towards the fixed point O is proportional to its distance from that point. The circle Q N Q¹ M is called the circle of reference.

The bob of a pendulum which is beating small oscillations is an actual example of simple harmonic motion. The maximum distance attained from the centre of the motion is called the amplitude, while the time of a complete oscillation backwards and forwards is the "periodic time" or the period. A diagrammatic representation of simple harmonic motion can be obtained by plotting the distance from the centre against the time; the resulting



curve is shown in Fig. 2. This curve is the outline of the section of the simplest type of water wave, or tidal wave.

The method of harmonic analysis is based on a mathematical theorem known as Fourier's theorem, which demonstrates that any periodic motion, however complicated, can be built up as a combination of simple harmonic motions. Thus the actual tides at a given port can be studied as the resultant of several different factors, such as the positions of the sun and moon, and the special local conditions, each factor expressing itself as a simple harmonic rise and fall of the water-level. This method was introduced by Lord Kelvin, who invented a machine which would carry out the harmonic analysis, and could be used to predict the tides for any time ahead. See Motion.

Harmonic Progression. Three quantities a , b , c , are said to be in harmonic progression when a is

to c as $(a-b)$ is to $(b-c)$, and b is then said to be the harmonic mean between a and c . It is easy to prove algebraically that the reciprocals of a , b , and c are in arithmetic progression, and this property may be used as an alternative definition. The origin of the term is ascribed to Pythagoras.

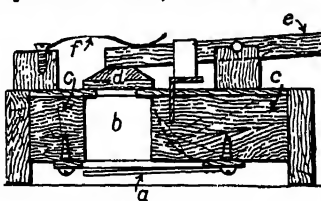
Harmonics. In physics, waves whose frequencies are multiples of the fundamental frequency. The difference in quality between different musical instruments sounding the same fundamental note is due to the presence of harmonics to varying degrees.

Harmonic Series. Partial tones which accompany every fundamental musical sound. When



an elastic body, such as a stretched string or a column of air in a tube, is set in vibration, there are produced many notes beside the fundamental one, and musical tone depends for its quality upon the proportions in which these other sounds are combined with the fundamental. The science of harmony also derives much of its justification from this phenomenon.

The series is as shown in the stave above when 8 ft. C is the fundamental; similar series are generated by all other notes; Nos. 7, 11, 13, and 14 are not in tune with the ordinary musical scale. Stopped pipes and cylindrical tubes, such as the



clarinets, produce only the odd numbers of the series. See Acoustics; Harmony.

Harmonious Blacksmith. The popular name for an Air with Variations in Handel's Fifth Suite (or lesson) for the harpsichord. The story of Handel's taking refuge from the rain in a smithy near Edgware is given at length in Rockstro's *Life of Handel*, 1893 (pp. 116-21). See Handel.

Harmonists. Communist religious society first organized in Württemberg, Germany, by John

George Rapp (1770-1847). In 1803 Rapp and his followers emigrated to America, and in Butler co., Pennsylvania, in 1805, formed the Harmony Society and the town of Harmony. In 1814 New Harmony was formed on the Wabash, Indiana; and in 1824 the Indiana property was sold to Robert Owen, and a new settlement, called Economy, started on the Ohio.

Under the management of Frederick Rapp (Reichart), adopted son of the founder, the society owned flourishing cotton, woollen, silk, and other industries, and made considerable advance also in intellectual culture, but a division occurred in 1832. The

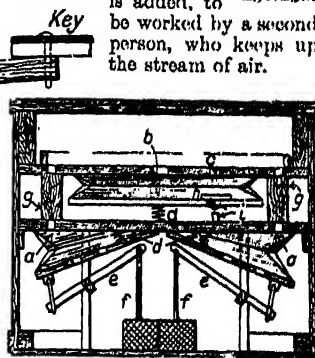
society became involved in debt and litigation. It was dissolved in 1906. The

members held all property in common, discouraged sexual intercourse, and believed the second coming of Christ to be near. See Rapp and His Associates, J. S. Duss, 1914.

Harmonium. Musical instrument with a keyboard or keyboards controlling the access of the wind from the bellows to the reeds which produce the sound. The bellows are actuated by two pedals worked by the player; in larger instruments, especially those which have a pedal keyboard, a hand lever is added, to be worked by a second person, who keeps up the stream of air.



Harmonium reed. A. Frame. B. Vibrating tongue.



Harmonium. Sectional diagrams illustrating essential parts of the instrument. Above, arrangement of interior: a, feeders; b, reservoir; c, wind-chest; d, spiral springs; e, cranks; f, cords connecting crank-levers to foot-boards; g, wind-trunks; h, safety valve; i, peg to open valve. Top, left, base end of sound-board: a, vibrator; b, mortise; c, sound-board; d, pallet; e, pallet-lever; f, spring.

The reeds (*q.v.*) are metal tongues of varying curve and thickness. They are free reeds passing through and through their frames as they vibrate. The reeds are fixed above the sound-board, in rows parallel with the keyboard, each reed being over a wind hole controlled by its appropriate key. The various stops govern strips of wood, padded, each of which closes or opens the complete set of holes belonging to a series of

reeds, much as in the organ, but of simpler mechanism. A smaller type of harmonium, called the folding organ, which is an octave higher, is used extensively at open-air religious meetings.

Owing to its penetrating tone, the harmonium gradually fell into disfavour in Britain, its place being taken by the American organ, which approximates more nearly to a true organ and has a mellow tone. *See Organ.*

tone more than perfect or major
are augmented and one semitone
less than perfect or minor are
diminished.

The first recorded attempts at combining musical sounds are those described by Hucbald, a Flemish monk of the 10th century. In his work, *Enchiridion Musicae*, an example appears as shown at (A) in the two staves below, being thus translated by Burney. This crude device was known as Organum or Diaphony. Later a drone or holding note was used, over which another part moved freely, as at (B). The note marked X suggests what is now known as a passing note, or one inessential to the harmony.

This method was succeeded by Discantus, which at first consisted in the simultaneous performance of two different tunes. This later development led to counterpoint,

HARMONY: ITS PLACE IN MUSIC

Sir Walter Alcock, M.V.O., formerly Organist, Salisbury Cathedral

The group of articles to which this belongs includes Music and Singing. See also Voice ; biographies of the great composers, Bach, Beethoven, Brahms, Handel, Mozart, and others, and the articles on musical terms, e.g. Chord : Counterpoint ; Fugue

Harmony may be defined as "the art of combining two or more sounds of definite musical pitch, according to accepted rules." Harmony is based upon the scale, which is a succession of eight notes designated alphabetically. The scale is of Greek origin, its introduction being about the middle of the 6th century B.C. The Greeks, though aware of the possibility of combined sounds, used their scales for melodic purposes. The Greek scales or modes may, roughly, be represented by any series of eight consecutive white keys upon the pianoforte. The Ionian mode which starts on C represents our major diatonic scale, and upon this and its minor variant our modern musical system is built. The harmonic possibilities of other series may be explored, such scales being the Aeolian (beginning on A), the Locrian (on B, but rejected), the Dorian (on D), the Phrygian (on E), the Lydian (on F), and the Mixo-Lydian (on G).

Musical sounds are complex. If a low note on the pianoforte be struck and held, notes of higher pitch will be heard, though of less power, simultaneously. These higher notes are called *harmonics*. Stringed instruments are rich in harmonics, and if the G string of a violoncello be sounded with the bow the harmonics given in addition to the generator (or open string) will be as are shown below. This is known as the *harmonic series*, and though it is not possible

to hear every note, their presence can be proved. The notes marked X can be arranged thus :

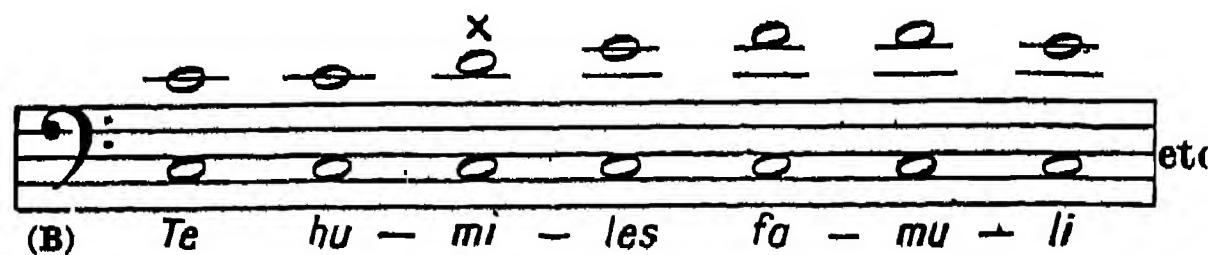


which is the diatonic major scale of C, starting from the 5th note, or *dominant*; and thus accounted for on acoustical grounds.

The study of harmony presupposes an accurate knowledge of intervals, or the distance from one note to another. Intervals are reckoned (1) from the number of names of notes they contain: (2) inclusively, *i.e.* counting both limits; and (3) upwards, *i.e.* from

which may be described as "the art of combining melodies."

The early rules of harmony were strict and binding, even the 6th being considered a discord. The gradual developments of the next four centuries led to a great advance, such as may be found in the work of Dufay, a Netherlander, born about 1360. Josquin Després, born about a century later, has been acclaimed as "one of the



the lower to the higher note. Intervals are either concords or discords. Concords are either perfect (4th, 5th, and 8th) or imperfect (major and minor 3rd, and major and minor 6th). 2nds, 7ths, and all augmented or diminished intervals are discords. Intervals one semi-

greatest geniuses of any period," and in his work there is abundant evidence of the great advance he achieved in developing the contrapuntal devices of his predecessors in the direction of harmony. Early in the 16th century Palestrina was born, and it is difficult to overestimate his influence on music. Of his numerous compositions, which are still in general use, the Missa Papae Marcelli is notable as having been written as an attempt to save the art from the degradation to which it had fallen by its

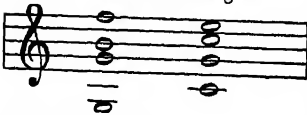


admixture with secular tunes of the worst description.

But the pioneer of modern harmonic thought was Claudio Monteverde, born at Cremona, in 1568. He struck out new paths of his own, questioning and disobeying many rules hitherto regarded as inviolable, and foreshadowing the all-important principle of the relation of chords through a common tonic, or key-note. His operas, *Arianna* and *Orfeo*, show a mastery never before attained. English composers, from Tallis and Byrd (16th century) to Henry Purcell (1658-1695), were also at work, experimenting in new directions. But Purcell, like Monteverde before him, not content with musical rule as he found it, thought for himself, and, experimenting in the most daring manner, wrote passages which command attention to-day. Purcell died when John Sebastian Bach was but ten years old. Bach summed up all that his predecessors had accomplished, and, until the 20th century brought complex departures from tradition, almost any chord in use could be found or was suggested in the works of this composer.

It is important to note how harmony has developed with the gradual improvement in musical instruments. Composition for voices is naturally restricted, as compared with what can be accomplished on instruments.

Music has been described as the resolution of discord into concord. A chord in which any note forms a concord with every other note, is called a concord. A chord in which any discord appears is called a discord. In the following:



the first chord contains the note F, which as a 7th from G is discordant with it. It is also a discord with the B, as they form a diminished 5th, which is a discord. The first chord, then, can give no sense of finality, and needs to be followed by one in which no discordant interval appears. That condition is fulfilled in the second chord, which is called the resolution of the first, and this is a simple example of a principle of which the possibilities of extension are endless. The greatest advances have been made by those daring enough to widen the harmonic outlook of their day.

It was necessary in early times to prepare a discord, i.e. the discordant note in a discord must be heard in the previous chord as a concord. In the following passage:



the F is a discord in the 2nd chord, but a concord (imperfect) in the 1st, and is therefore said to be prepared. Even Monteverde dared to disregard this rule, writing in his madrigal, *Cruda Amarilli*, a seventh and a ninth without preparation. The reverse of this may be seen in Schumann's *Enttreat Child*, which concludes with an unresolved 7th.

Systems of harmony have been devised from time to time, but the developments of composition leave them successively out of date, while the modern scale, consisting of whole tones, opens up new fields of thought which are being widely explored. Alfred Day published a treatise in 1845, and his theories have been more or less adopted by other writers. The broad principles of these various treatises agree in the main, and such progressions as consecutive perfect 5ths, and octaves between any two parts, have been universally condemned. Day considered the bad effect of the former to be due to the fact that the two parts moved virtually in two different keys. Consecutive octaves were regarded as weakening the part-writing by making two voices sing the same notes, though one or more octaves apart. Consecutive unisons were forbidden for the same reason.

Harmony, PRE-ESTABLISHED. In the philosophical system of Leibniz, the theory that all the monads (or primary elements), although independent of each other, were connected by a "pre-established" harmony, previously determined by God, whereby what was produced in one monad was reflected in the rest.

Harmsworth. The name of a family several members of which had notable careers in publishing and politics. Viscount Northcliffe, Viscount Rothermere, and Baron Harmsworth, three of the 14 children of Alfred Harmsworth (1837-89), barrister of the Middle Temple, are described separately. A fourth son, Robert Leicester (1870-1937), Liberal M.P. for Caithness 1900-18, was made a baronet 1918. The name Harms-

worth became familiar to the public in the early 20th century through the titles of serial publications originated by Northcliffe.

Harmsworth, Cecil Bisschopp Harmsworth, 1st Baron (1869-1948). British politician. Born Sept. 28, 1869, the third son of Alfred Harmsworth and a younger brother of Viscounts Northcliffe and Rothermere, he was educated at Trinity College, Dublin, where he had a brilliant career, being senior moderator in literature. He joined his brothers in the firm of Harmsworth Bros. He was Liberal M.P. for Droitwich 1906-10, for S. Beds 1911-22, became under-secretary for home affairs 1915 and for foreign affairs 1918-22. He was raised to the peerage as Baron Harmsworth in 1939, and died Aug. 13, 1948, being succeeded by his son Cecil (b. 1903).



Baron Harmsworth,
British Politician

Harnack, ADOLF VON (1851-1930). German theologian, born at Dorpat (Tartu), May 7, 1851, he was the son of Theodosius Harnack, professor of theology there. He started his career in 1874 as lecturer on church history at Leipzig, becoming professor at Leipzig, 1876, at Giessen, 1879, at Marburg, 1886, at Berlin, 1889-1924. In 1890 he was made a member of the Prussian academy of science, and its historian and simultaneously during 1905-21 director of the state library. In 1914 he received a Prussian peerage.

Harnack was the greatest German Protestant theologian of his period, liberal and critical, and appreciative of the Greek influence upon Christianity. As president from its creation, 1910, of the Kaiser Wilhelm Gesellschaft der Wissenschaften, which organized and financed research in all fields of science, he exercised a dominating influence upon German intellectual life, his lectures and writings reaching circles far beyond his specific theological field. His *History of Dogma*, 1888-89, Eng. trans. 1895-1900, and subsequent *Outlines of the History of Dogma*, English trans. 1893-97; *Monasticism: Its Ideals and Its History*, Eng. trans. 1903; *History of Early Christian Literature*, 1893-1904; *Nature of Christianity*, 1900; and his autobiography, edited in 1930 by his son Axel

(murdered by the Nazis 1944), are outstanding. He was co-editor with von Gebhardt and T. Zahn of the *Apostolic Fathers*, 1876-78, trans. Robertson, and edited the *Theologische Literaturzeitung*.

Haroeris OR AROERIS. Grecised name of the Egyptian sun-god, Horus the Aged. He is represented as a hawk-headed man leaning on a staff, and is not to be confused with Horus the Younger, the son of Osiris and Isis. See *Horus*.

Harold. Masculine Christian name. Of Teutonic origin, it means power for war and in England has retained or perhaps recovered the popularity it won in Anglo-Saxon times. It was introduced by the Danish invaders. In Scandinavian countries it is spelled Harald.

Harold I, CALLED HAREROOT (d. 1040). King of the English, 1037-40. A son of Canute the Great by an English mother, he came into

Godwin and his sons were banished he went to Ireland, but was soon in England again, and when Godwin died in 1053 became earl of Wessex. Henceforward he was the most powerful man in the land. His wars against the Welsh gave him a reputation as a fighter, and when Edward died he was chosen and crowned king. A double danger now threatened him. His brother Tostig came from Norway with Harold Haardraade, the king of that country, to recover his lost earldom of Northumbria; and William of Normandy claimed the crown which, he alleged, Harold had promised to secure for him when shipwrecked off the coast of France. Harold crushed the Norwegians at Stamford Bridge, but was killed at Hastings, Oct. 14, 1066. See *Hastings*, *Battle of*.

Harold I (c. 850-c. 933). King of Norway 872-c. 930, known as

930, he divided his kingdom. After his death, c. 933, his eldest and youngest sons, Eric Blood-Axe and Haakon I, fought for the sovereignty, and the former was driven into exile.

Harold III (1015-66). King of Norway 1048-66, known as The Severe in Council (Haardraade). He was a son of King Sigurd and half-brother of King Olaf (S. Olaf). When the latter was killed at the battle of Stiklestad, 1030, Harold fled to Russia, where he fell in love with a princess at Novgorod. He then went on to Constantinople, where he became leader of the imperial Varangian guard. He left Constantinople in 1044 for Russia, married the daughter of the prince of Novgorod, and in 1046 returned to Norway, where he shared the kingdom with his nephew, Magnus, and later, 1048, succeeded him as sole ruler. In 1066 he invaded England in support of Tostig, the brother of the English Harold, and was killed at the battle of Stamford Bridge (*q.v.*), Sept. 25, 1066.

Haroun Al Raschid (763-809). Caliph of Bagdad. Haroun was born at Rai, March 29, 763, and was sent by his father, Mohammed Mahdi, to take part in the invasion of the Eastern Empire in 781; he reached the Bosphorus and imposed tribute on the Empress Irene, 782. He succeeded his brother Musa, as fifth caliph of the Abbaside line, in 786, and opened a reign proverbial for its magnificence and prosperity. Haroun made his court a great centre of art and literature. He waged successful wars against the Greek Empire, 797, and suppressed various provincial revolts.

At first he ruled with the powerful aid of the Barmecides, but sudden jealousy made him order their wholesale murder in 803. In the same year he marched against the emperor Nicephorus, invading Phrygia and destroying Heraclea, and exacted heavy tribute from him. On his way to quell a rising in the province of Khorasan, Haroun died at Tus in March, 809. His name is still remembered, if only as a central figure in *The Arabian Nights*. He was a man of considerable talents and culture, but lacking in strength of character. See *Arabian Nights*; consult also *Haroun al-rashid*, H. St. J. B. Philby, 1933.

Harp. Musical instrument with strings plucked by the fingers. Used in one form or another by all races and from remote ages, its earliest forms seem to have been suggested by the hunting bow, whose tightly stretched string will emit a note of fair musical value;



Harold II. The Battle of Hastings and the death of Harold, struck in the forehead by an arrow, Oct., 1066

From a print after P. J. de Loutherbourg

prominence on his father's death in 1035. England had been left by Canute to his son Hardicanute, who was already king of Denmark, but Harold, more of an Englishman than his half-brother, also claimed it. Both had stout supporters, and the Witan divided England between them, Harold becoming king of the district N. of the Thames. Shortly afterwards Earl Godwin and his party tired of serving the still absent Hardicanute, and in 1037 Harold became king of all England. His reign was disturbed by invaders from Scotland and Wales. He died at Oxford, March 17, 1040.

Harold II (c. 1020-66). King of the English. A son of Earl Godwin, he became earl of East Anglia in the time of his brother-in-law, Edward the Confessor. When

Fair-Hair (Haarfagr). He was a son of Halfdan the Black, one of the petty rulers among whom Norway was then divided. According to the sagas he fell in love with a beautiful girl, Gyda, who refused to marry him while any other king ruled in all Norway; Harold then vowed that he would not comb or cut his hair until he had obtained the sole kingship. After overcoming several of his neighbours, in a sea-fight at Hafursfiord in 872 he overcame the confederated rulers and united the kingdom. His defeated rivals migrated to the Faroes, Hebrides, Orkneys, Shetland, and Iceland, all of which, except Iceland, he subsequently subdued. He proved a capable ruler of his people, but was troubled by the quarrels of his many sons, among whom, about

when a portion of the bow is reinforced by a hollow resonator the tone is vastly improved. This kind appears to have been carried on the shoulder.

It is a short step from this to an instrument of the Old Egyptian type.

Bow-shaped and two-sided harps were limited in power by the ability of their material to stand the strain of the strings. It was

up inside the sound box or resonator, the back of the harp, and actuate little cranks which act on the strings as described.

At the close of the 19th century Messrs. Pleyel brought out a new form of chromatic harp, requiring no pedals. It has a string for each semitone in two sets representing respectively the black and the white keys of the pianoforte. These sets cross each other slightly instead of being in the same plane, so that the player commands either the diatonic or the chromatic notes by pluck-

ing the strings at different levels, while a rapid chromatic scale is obtainable by running a finger across the centre where the sets pass each other. Harp music is written on two staves, like pianoforte music, and at actual pitch.

Harpagus. Median general. Ordered by Astyages, king of the Medes, to put to death the infant Cyrus, he handed him over to a shepherd, who spared his life. When Astyages discovered this, he killed Harpagus's son and served him up before his father at a meal. When Cyrus grew up, Harpagus encouraged him to revolt against Astyages, who was defeated and dethroned. (Herodotus, Book I, 80-177.) Harpagus became a trusted general of Cyrus (the Elder), and reduced the Greek cities of Asia Minor to subjection.

Harpalus. Treasurer of Alexander the Great. Having betrayed his trust, he absconded from Babylon to Athens with a large sum of money, with which he attempted to bribe public men to support him against Alexander and Antipater, his regent in Europe. Demosthenes was one of those accused of having accepted bribes. Harpalus failed, however, in his object, and to avoid being handed over to Antipater he fled to Crete, where he was murdered.

Harpalyce. In Greek mythology, daughter of Harpalycus, a Thracian king. Famous for her swiftness of foot and skill in manly exercises, after her father's death she lived in the forests, supporting herself by robbery and plunder. She was at last caught in a net by some shepherds and put to death. *Pron.* Harpali-see.

Harpenden. Urban district of Hertfordshire, England. It is 25 m. N.W. of London on the

ry. from St. Pancras station. At Rothamsted, near by, in 1843, Sir John Lawes (*q.v.*) started an agricultural experimental station concerned chiefly with fertilisers, and his name is commemorated in the Lawes Testimonial Laboratory. At Harpenden also are the S. George's co-educational school, and the National Children's Home.

The 12th-century parish church was, with the exception of the tower, rebuilt in 1802, and contains some interesting glass and brasses. A Celtic cross on Church Green was unveiled 1920 in memory of the 164 Harpenden men who fell in the First Great War.

The urban dist. council maintains a public hall (completed 1938), open spaces, a cemetery, allotments, etc. The public library is maintained by the Hertfordshire county council. Rothamsted Park and the spacious Harpenden Common, widening out from the south end of the town, is in the ownership of the council. Pop. (1951) 14,236.

Harper and Brothers. American firm of publishers with a branch in London. In 1812 James Harper (1795-1869), son of Joseph Harper, a farmer of Newton, Long Island, with his brother John (1797-1875), started a printing business in New York, producing books for booksellers and publishers. Later they began publishing on their own account, and, joined by two younger brothers, Joseph Wesley (1801-70) and Fletcher (1806-77), founded in 1833 the publishing firm of Harper and Brothers. They started Harper's Family Library, a kind of serial publication, which led, in 1850, to the founding of Harper's Magazine (*v.i.*). This was followed in 1857 by Harper's Weekly, in 1867 by Harper's Bazaar, and in 1881 by Harper's Young People, later Harper's Round Table. In 1899 the firm was formed into a company,

of which George Harvey was president. James Harper was mayor of New York City, 1844-46. *Consult* The House of Harper, J. Henry Harper, 1912.



Harp. 1. Contemporary form for orchestra. 2. As depicted in an ancient Egyptian tomb-painting

therefore an important advance when a third side was added, as in the next primitive form.

No reasonable limit was now set to the number or the tension of the strings, allowing much greater variety and power, and it only required the accumulated experience of a few centuries of makers and players to raise this type to the finished modern form.

This kind of harp is essentially a diatonic instrument, set in one key, and possessing only seven strings in each octave, but, in the eighteenth century, mechanism was added to shorten some of the strings at will, and thus allow changes of key. The final improvement, after many partial attempts, was made about 1810 by Sebastian Erard, who built a double-action harp of six and a half octaves in the key of C flat, with seven pedals to be depressed halfway or entirely, raising each string respectively a semitone or a tone. Rods from the pedals pass



James Harper, American publisher



John Harper, American publisher

Harper's Ferry. Town of W. Virginia, U.S.A., in Jefferson co. It stands at the junction of the Shenandoah and Potomac rivers, 55 m. N.W. of Washington, and is served by the Baltimore and Ohio rly., which crosses the Potomac here, and by the Winchester and Potomac rly. A river gorge through the Blue Ridge Mts., and the surrounding heights—the Maryland, the Virginia or Loudon, and the Bolivar Heights—contribute to the region's outstanding scenic beauty. Storer College and a normal school for Negroes are here. Pop. 766.

Settled in 1747, Harper's Ferry, largely because of its water-power, was chosen by George Washington as the site of an arsenal and armoury, established 1796. In 1859, the abolitionist, John Brown (*q.v.*), and a few followers raided the arsenal in an abortive attempt to free and arm the slaves, the already high feeling between North and South being further inflamed when he and six comrades were hanged. A strategic spot in the Civil War, Harper's Ferry changed hands several times. It

was the scene of a major Union disaster in 1862, when the surrounded Federal force surrendered to Stonewall Jackson, the Confederates capturing 12,500 prisoners and 13,000 small arms and other weapons.

Harper's Magazine. Monthly magazine founded in New York, June, 1850, published by Harper and Brothers. In 1880 it began to be issued simultaneously in London and New York. Devoted to travel, science, literature, and art, it maintained a very high standard, Dickens, Thackeray, Tennyson, and Mark Twain being among its early contributors. Until 1925 Harper's was illustrated, artists whose work it used including George Du Maurier, Joseph Pennell, and John W. Alexander; but in that year, after an exhaustive questionnaire among its subscribers, the style of the magazine was radically changed, advanced and informative reading matter being substituted for the illustrated fiction which had previously been its main feature. Contributors of later years have included Aldous and Julian Huxley,

Bertrand Russell, J. B. S. Haldane, Walter Lippmann, Gilbert Murray, and Christopher Morley.

Harpignies, HENRI JOSEPH (1819–1916). French landscape painter. Born at Valenciennes, he studied in Paris under Achard, and in Italy. In 1866 his *Evening in the Roman Campagna* was bought for the Luxembourg, and in 1884 his *Moonrise* found its way to the same gallery. He died, painting almost to the last, on Aug. 25, 1916.

Harpocrates. The Greek name of an Egyptian deity, Horus the Child. Worshipped among the Greeks and Romans, and represented with a finger to his lip, he was the god of silence. See Horus.

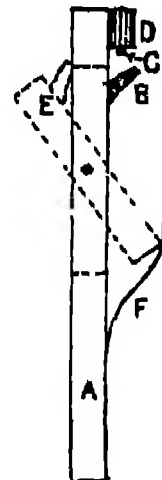
Harpoon (Fr. *harpon*, grappling iron). Weapon used for the capture of whales, etc. The harpoon is fired from a gun mounted in the bows of a small, fast steamer, and

has a barbed tip containing a bomb with a time fuse. The gun has a bore of $3\frac{1}{2}$ ins., and is usually breech-loading. The steel weapon is 6 ft. in length and when fired from the gun by a charge of gunpowder or ballistite, enters the

whale's body to a considerable depth. The four 12-in. barbs folded flat in the head open out as the attached rope is pulled taut; and the bomb explodes three seconds after leaving the gun, killing the whale. Harpoons are also used for catching sharks and other large fish; and experiments have been made with an electric harpoon, which electrocutes the quarry.

Harpsichord (Ital. *clavicembalo*, abbrev. *cembalo*; Fr. *clavecin*; Ger. *clavizimbel*). The most important of the stringed instruments with keyboards before the invention of the pianoforte. It answered

all purposes in solo and chamber music which the pianoforte now serves, and also occupied a unique position in the orchestras of the 17th and 18th centuries, being used to fill in chords according to the

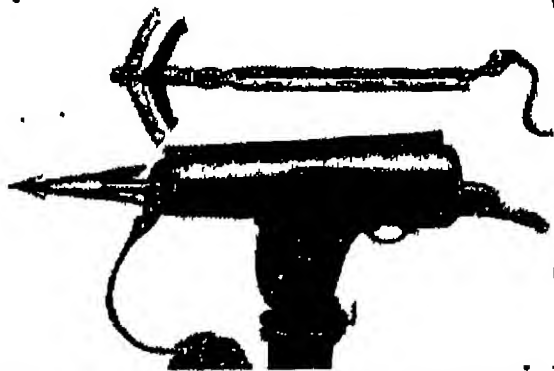


Harpsichord.
Mechanism
of jack

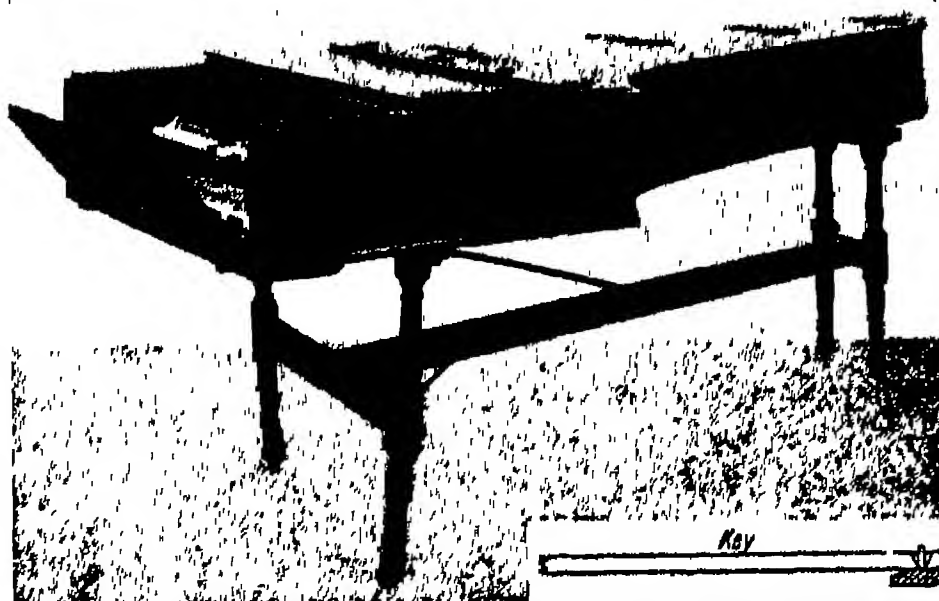
- A. Jack.
- B. Plectrum of quill or leather.
- C. String.
- D. Damper to stop sound when jack returns to place.
- E. Dotted lines showing plectrum falling out of the way when descending.
- F. Spring, of bristle, to restore the plectrum carrier to the vertical position.

figured bass, and to accompany entirely the *recitativo secco*. The essential difference between the harpsichord and the pianoforte is that in the latter the strings are struck by hammers, whereas in the former they are plucked by quills or rather plectra inserted in "jacks" or uprights, which are caused to pass the strings when the keys are depressed. The harpsichord proper is usually shaped like the modern grand piano, but spinets and virginals, and some other forms, are sometimes given the name. No expression, in the full sense of the word, is possible on the harpsichord, but in the 18th century instruments had elaborate contrivances for securing variety, such as an extra keyboard, stops controlling plectra of various degrees of hardness, and a swell (*q.v.*).

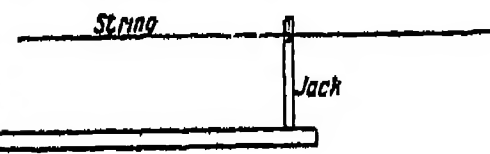
Harpy (Gr. *harpusia*, snatcher). In Greek mythology, monstrous bird with a woman's head and long claws. Harpies were sent by the gods to torment the blind Phineus by snatching his food whenever he raised it to his lips. The expedition of the Argonauts (*q.v.*) passed the Ionian Islands where they dwelt, and Calais and Zetes, the sons of Boreas, delivered Phineus from his tormentors. Virgil parallels this episode, placing his Harpies on the islands of the Strophades. The Harpies are personifications of the storm-winds, which swept away mortals at the bidding of the gods, bearing them to the lower world.



Harpoon. Gun with bomb-nosed harpoon. Above, harpoon with barbs extended



Harpsichord. English 17th cent. model with double keyboard, 5-octave range, exhibited at the Victoria and Albert Museum, South Kensington. The diagram shows the working of the jack and the string



Harry Eagle (*Harpyia harpyia*). Large and powerful bird of prey, found in Central and S.



Harry Eagle, a South American bird of prey
W. S. Berridge, F.Z.S.

America. Its general colour is white, with a black back and tail and grey wings; on the head is a crest of feathers which when erected gives the bird a somewhat owl-like aspect. It is not a true eagle, but is placed between the eagle and the buzzard. It is slightly over a yard in length, and has a strongly curved beak and powerful claws. It is found in the forests, usually near a river or stream, and spends much of its time watching on the topmost boughs of some dead tree. It will kill animals much larger than itself, young deer, peccaries, monkeys, badgers, and sloths being among its favourite prey. It nests either in a tall tree or on the ledge of an inaccessible cliff.

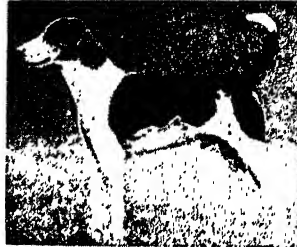
Harraden, BEATRICE (1864-1936). English novelist. Born at Hampstead, London, Jan. 24, 1864, she was educated at Cheltenham Ladies' College, Dresden, and London university. She made her reputation with *Ships that Pass in the Night*, 1893, a story depending for its interest almost entirely upon its fine character studies. Other novels include *The Fowler*, 1899; *Katherine Frensham*, 1903; *The Scholar's Daughter*, 1906; *The Guiding Thread*, 1916; *Rachel*, 1926. In *Varying Moods*, 1894, is a volume of short stories. She died May 5, 1936.

Harran. Ancient city in northern Mesopotamia (Turkey). E. of the Euphrates, 100 m. W. of Nineveh. It is mentioned (as Haran) in association with Abraham (Gen. 12, v. 4). The moon god, Sin, specially venerated at Harran, was the chief god of Ur, which also appears in the story of the patriarch's wanderings. Harran lies on ancient trade routes, in fertile country disputed by Hittite, Mitannian, and Assyrian. The Assyrians conquered the city, and it became their last refuge after the fall of Nineveh. Archaeological survey of the Harran valley, and excavation of the site of Sultan Tepe not far away,

in 1951 added much to knowledge about the ancient history of the region. Harran is the classical Carrahae, where the Parthians defeated the Romans 53 B.C.

Harrier. Breed of hound used for hunting the hare by scent. In appearance it closely resembles the foxhound, but in size is intermediate between that hound and the beagle, standing about 20 ins. high at the shoulder. Probably it was derived from a strain of small foxhound, and in England most of the harriers are actually crossed with that breed. In Wales the pure-bred strain is still found.

The harrier can be readily distinguished from a small foxhound by its longer and more pointed ears, and it should have a narrower and longer head. Many packs are kept, especially in Ireland, where the sport of hare-hunting is very popular. The hunt is a somewhat



Harrier. A winning hound in a harrier and beagle show

slow one, but harriers will follow a cold scent that would completely baffle the ordinary foxhound. See Dog; Foxhound; Cross-Country Running.

Harrier (*Circus*). A genus of hawks, including about 23 species. They are slender in form, with un-

usually long legs and wings, and comparatively short and small beaks. They do not frequent trees, but are usually found in marshy districts, where they prey upon fish and frogs, in addition to small birds and mammals. Four species occur in Great Britain. The hen harrier (*C. cyaneus*), so called from its habit of preying upon poultry, has now become rare. Montagu's harrier (*C. pygargus*) was formerly common, but is now seldom seen; the marsh harrier (*C. aeruginosus*), the largest of the three, has been



Harrier. Specimen of *Circus cyaneus*

almost exterminated in England; the pallid harrier (*C. macrourus*) is extremely rare.

Harriman, FLORENCE JAFFRAY. American diplomat. The wife of J. Borden Harriman, she was appointed U.S. minister to Norway, 1937. In April 1940 a message from her gave the world the first news of the German invasion of Norway. She left Oslo in 1941, publishing *Mission to the North* in the same year.

Harriman, WILLIAM AVERELL (b. 1891). An American diplomat. Harriman was born on Nov. 15, 1891, and was educated at Groton and Yale. After he had graduated, 1913, he took part in his father's railway enterprises. He entered government service during president F. D. Roosevelt's first term, becoming in 1941 director of the raw materials department of the office of production management. In that year Harriman went to London and Moscow as the president's personal representative to expedite U.S. Lend-Lease (q.v.) aid. He was ambassador to Russia, Oct., 1943-Feb., 1946. Ambassador to Great Britain, March-Sept., 1946, he was then secretary of commerce. He later held various appointments connected with foreign aid.



Averell Harriman, U.S. diplomatist

Harringay. Residential dist. in the borough of Hornsey, N. London. Built in the late 19th century over the once open country called Green Lanes, a name now given to a main thoroughfare, it lies between Finsbury Park and Hornsey. Harringay is a variant of Harington, Harington, or Harringay, by one or the other of which names Hornsey (q.v.) was known between the 13th and 16th centuries. There are a greyhound racing track and a sports arena where orchestral concerts were inaugurated in 1947.

Harrington, OR HARTINGTON, JAMES (1611-77). English political philosopher. He was born at Upton, Northants, Jan. 7, 1611. Educated at Trinity College, Oxford, he travelled widely in Europe and at Venice imbibed an enthusiasm for republican government. This did not preclude affection for Charles I, under whom he became a gentleman of the bedchamber, accepting a post with the king in captivity in 1647.

But he was thrown into the Tower at the Restoration, but was released, and died Sept. 11, 1677, his last years having been clouded by mental failure.

Harrington is known for one book, *Oceana*. Published in 1656 and dedicated to Cromwell, it is a treatise on government, England being *Oceana*. It shows its author to be the most original political thinker of his time. He advocated the replacement of large estates by small holdings; compulsory education; election by ballot of the executive; and an executive drawn from all classes in rotation. *Oceana* was admired by Hume and Coleridge and studied by the makers of the American constitution and the French Revolution.

Harris. Name of southern part of the island of Lewis-with-Harris, one of the Outer Hebrides. It is about 20 m. long and of varying breadth, and is a mountainous and barren district. It forms part of the county of Inverness. The parish includes a number of adjacent islands, St. Kilda among them. Sheep are reared and wool is woven into tweed (see *Harris Tweed*). The Sound of Harris, which divides it from North Uist on the S., is the only channel of the Outer

ster and Woolwich. He entered the army, 1760, and was severely wounded at Bunker Hill in 1775. Proceeding to India as aide-de-camp to General Medows, he served in the first campaign against Tippoo Sahib in 1790-91, and was afterwards given a high appointment in Madras. In the second campaign he was in command of the operations which, in 1799, ended with the storming of Seringapatam and the annexation of Mysore. In 1815 he was created Baron Harris of Mysore and Seringapatam. He died at Belmont, Kent, in May, 1829.

Harris, GEORGE ROBERT CANNING HARRIS, 4TH BARON (1851-1932). A British politician and cricketer. Born Feb. 3, 1851, he was educated at Eton and at Christ Church, Oxford. In 1872 he succeeded to the title. As a cricketer he was in the Eton eleven for three years (1868-70), while he played for Oxford against Cambridge in 1871, 1872, and 1874.



Lord Harris,
Kent and England
cricketer

He joined the Kent county team, and in 1875 became its captain, retaining that post until 1889. Harris played for England against Australia in a Test match in 1880, and captained a team that went to Australia. As a Conservative politician, he was under-secretary for India, 1885-86, and for war, 1886-89. During 1890-95 he was

governor of Bombay. Later he was associated with industrial undertakings in S. Africa. He published *A Few Short Runs*, 1921. After his death, March 24, 1932, a garden was laid out at Lord's as a memorial to him.

Harris, SIR ARTHUR TRAVERS (b. 1892). British air officer. Born at Cheltenham, April 13, 1892, he began his military career in 1914 with the 1st Rhodesian Regiment, transferring to the R.F.C. a year later. He joined the R.A.F. 1919, becoming air commodore, 1937, air vice-marshal, 1939, air marshal, 1941, and air chief marshal, 1943. Deputy chief of air staff, 1940-41,

he was A.O.C.-in-C., Bomber Command, 1942-45. A firm believer in mass raids, "Bomber" Harris



Sir Arthur Harris,
British air officer

directed the British bombing attacks of the Second Great War on Germany's industrial centres. Sir Arthur was made K.C.B. 1942; G.C.B. and Marshal of the R.A.F. 1945, baronet 1953. He retired in 1945 and in 1946 published *Bomber Offensive*.

Harris, SIR AUGUSTUS HENRY GLOSSOP (1852-96). British actor and theatrical manager. Born in Paris, he made his first appearance at the Theatre Royal, Manchester, in 1873. In 1879 he became lessee of Drury Lane, and with Meritt and Pettitt wrote *The World* (produced July 31, 1880), the first of the spectacular melodramas which helped to revive the prosperity of the house. He also staged pantomimes at



Augustus Harris.

Drury Lane on a scale of great splendour. He was sheriff of London 1890-91, being knighted 1891. Died at Folkestone, June 22, 1896.

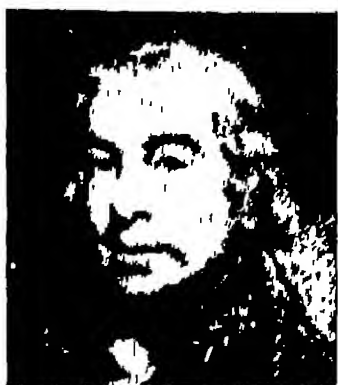
Harris, FRANK (1856-1931). British journalist and author. Born Feb. 14, 1856, of Welsh parentage, in Galway, he emigrated to Canada when 15. Returning to Europe, he studied in Paris, Heidelberg, Göttingen, Berlin, and Athens. In 1881 he began to write for *The Spectator*, and in 1882 became editor of *The Evening News*, which he left to edit *The Fortnightly Review*, 1888-93.

Proprietor and editor of *The Saturday Review*, 1894-98, he afterwards edited *Vanity Fair*, and was founder and editor of *The Candid Friend*. During the First Great War he went to the U.S.A. and, adopting violently pro-German views, never returned to England. He was closely associated with Oscar Wilde at the climax of the latter's career in the '90s; his *Life of Shaw*, with whom also he had had some acquaintance, excited controversy. Shakespearian critic,



Harris, Outer Hebrides. Tarbert, chief town of this part of the island of Lewis-with-Harris, from the east

Hebrides for large vessels. It is 10 m. long and about 7 m. wide. Tarbert is the chief place. In 1920 about 60,000 acres of Harris were purchased by Lord Leverhulme. Area 176 sq. m. Pop. (1951) 3,121.



1st Baron Harris,
British soldier
After A. W. Davis

Harris, GEORGE HARRIS, 1ST BARON (1746-1829). British soldier. Born at Brasted, Kent, March 18, 1746, the son of a clergyman, he was educated at Westminster

playwright, and author of some notably good short stories, his works include *Elder Conklin*, 1894; *Montes the Matador*, 1900; *The Bomb*, 1908; *The Man Shakespeare*, 1909; *The Women of Shakespeare*, 1911; *Oscar Wilde, his Life and Confessions*, 1920; *My Life*, 1926; *Life of Bernard Shaw*, 1931; play, Mr. and Mrs. Daventry, 1900. Frank Harris: *His Life and Adventures*, an abridged version of his 4-vol. privately printed autobiography, was published 1947 with an introduction by Grant Richards. Harris died Aug. 26, 1931.

Harris, Henry Wilson (1883-1955). British author and journalist. He was born Sept. 21, 1883, at Plymouth, and educated there and at St. John's College, Cambridge. Joining the *Daily News* in 1908, he became successively news editor, leader writer, and diplomatic correspondent. As editor of the *Spectator* 1932-53, he wrote under the pseudonym Janus incisive and witty comment on many topics. Specialising in international problems, the League of Nations, arbitration, and disarmament, he published *President Wilson, His Problems and Policy*, 1917; *The League of Nations*, 1929; *The Future of Europe*, 1932; *The Daily Press*, 1943; *Problems of the Peace*, 1944; *Lives of Caroline Fox*, 1944, and *J. A. Spender*, 1945; memoirs, *Life So Far*, 1954. Independent M.P. for Cambridge University, 1945-50. he died at Hove, Jan. 11, 1955.

Harris, Howel (1714-73). The founder of Welsh Calvinistic Methodism. Born at Trevecca, Brecknockshire, Jan. 23, 1714, he was for a time a teacher in a church school but devoted the greater part of his life to itinerant preaching. He founded a number of societies and chapels, formed a community at Trevecca in 1752, served in the Brecknockshire militia, 1759, was a friend of the Wesleys, and wrote an *Autobiography*, pub. 1791. He died July 21, 1773. *Consult Life*, T. Jackson, 1837.

Harris, James Rendel (1854-1941). British scholar. Born at Plymouth, he was educated at the grammar school there and at Clare College, Cambridge, of which he became a fellow and librarian. He was professor at Johns Hopkins university, Baltimore, 1882-85; at Haverford College, Pennsylvania, 1886-92; lecturer in paleogeography at Cambridge, 1893-1903; professor of theology, Leyden, 1903-04; director of studies, Friends' Settlement, Woodbrooke,

near Birmingham, 1903-18; and Haskell lecturer at Oberlin College, 1910. President of the Free Church Council, 1907-08, he became curator of MSS. at the John Rylands Library, Manchester, 1918.



J. Rendel Harris,
British scholar
Russell

He travelled widely in the East, where he discovered important MSS. bearing on the Bible. His numerous works include *The Teaching of the Apostles*, 1885; *Some Syrian and Palestinian Inscriptions*, 1891; *The Dioscuri in Christian Legend*, 1903; *Sidelights on New Testament Research*, 1909; *Origin of the Cult of Dionysos*, 1915; *Origin of the Cult of Artemis*, 1916; *Ascent of Olympus*, 1917; *Origin of the Doctrine of the Trinity*, 1919; *Jesus and Osiris*, 1927; *Builders of Stonehenge*, 1933. He died March 1, 1941.

Harris, Joel Chandler (1848-1908). American writer popularly known as Uncle Remus. Born at Eatonton, Georgia, Dec. 8, 1848, he worked in a printing office, studied law, and practised at Forsyth. In 1876 he joined the staff of The



Joel Chandler Harris

Atlanta Constitution, of which he was editor, 1890-1901, and to which he contributed the first of his Uncle Remus stories concerning the adventures of Brer Rabbit and Brer Fox. These stories, derived from his knowledge of Negro folklore, were first collected in 1880 as *Uncle Remus: His Songs and His Sayings*. This volume had a number of successors, including *The Tar-Baby and Other Rhymes*, 1904. When he issued his first book he knew little or nothing of folklore in general, and was astonished when he began to receive letters from learned bodies asking him to explain the connexion between his stories and those of a similar kind told in other parts of the world.

He was the author of a *Life of H. W. Grady* (his predecessor as editor of The Atlanta Constitution) 1890, and of *Georgia from*

the Invasion of De Soto to Recent Times, 1899. He died at Atlanta, Georgia, July 3, 1908. *See Brer Rabbit; consult also Life and Letters of Joel Chandler Harris*, by his daughter-in-law, Julia Collier Harris, 1918.

Harris, Thomas Lake (1823-1906). British-born U.S. mystic. Born at Fenny Stratford, Bucks, England, May 15, 1823, he went with his parents in 1828 to the U.S.A., became a universalist, a Swedenborgian, and then a spiritualist. In 1861 he founded the Brotherhood of the New Life. Laurence Oliphant (q.v.), who has described him in his *Masollum*, 1886, was for a time one of his converts. He visited England 1859-61 and 1865-66, claimed that his poems were revealed to him in trances, and was the author of *Truth and Light in Jesus*, 1860; *The Millennial Age*, 1861; *The Great Republic, a Poem of the Sun*, 1867. He died at Santa Rosa, California, March 23, 1906. *Consult Life*, A. A. Guthbert, 1908.

Harrisburg. City of Pennsylvania, U.S.A., the capital of the state and the co. seat of Dauphin co. It stands on the Susquehanna river, 105 m. W.N.W. of Philadelphia, at the head of the Cumberland and Lebanon valleys. It is served by the Pennsylvania and other rlys., and is an airport.

It has two road and two railway bridges. Buildings include the capitol, the education building, housing the Pennsylvania state library and the state archives, the Pennsylvania state museum, the Dauphin co. historical society library, the Harrisburg academy (for boys), the state farm products show building, including eleven acres under one roof, where the annual agricultural show is held, and the adjoining farm products show arena, which seats 12,000.

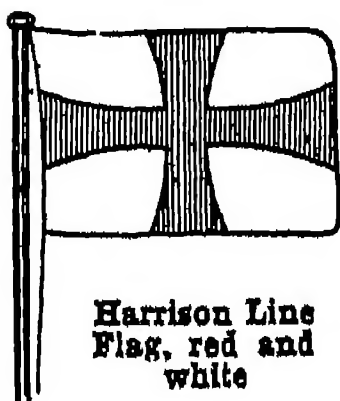
The city has a park system of approximately 1,100 acres, recreational facilities including a municipal beach on an island in the river, a five-mile riverside park, and Front Street, a riverside residential street in which the governor's mansion stands, and the Soldiers' and Sailors' Memorial Bridge, a viaduct crossing the Pennsylvania rly. tracks and leading to the capitol site, and commemorating those who fell in the 1914-18 war.

Iron and coal abound, the latter being salvaged from the river bed for the use of local industries which produce iron and steel, boilers and engines, bookbinding machinery, chemicals, cigars and tobacco,

knitted goods, textiles, shoes, ice cream, candy, and processed foods. There are freight classification yards, meat-packing plants, and printing establishments. The surrounding area engages in farming, dairying, livestock and poultry raising. Settled 1715, Harrisburg became state capital 1812 and a city 1860. Pop. (1950) 89,544.

Harrismith. A town of Orange Free State, S. Africa, named after Sir Harry Smith (*q.v.*). It is 60 m. by rly. N.W. of Ladysmith and 170 m. N.W. of Durban, on the river Wilge among the mountains at a height of over 5,000 ft. The chief building is the block containing town hall, public library, and market, opened in 1908. Harrismith is a trading centre for the district and is a health resort; it has also long made woollens. During the South African War it was occupied by the British, Aug. 4, 1900. Pop. (1951) 12,786, of whom 4,019 were white.

Harrison. British steamship line. It was founded in 1830, as the Charente Steamship Co., being known later by the name of its managers, T. & J. Harrison. Its chief services are between Liverpool and ports in the Gulf of Mexico, the



Harrison Line
Flag, red and
white

W. Indies, and Brazil; also to Calcutta, S. Africa, and E. Africa. From Calcutta its steamers go to the River Plate and S. Brazil. The London offices are 4, Fenchurch Ave., E.C.3.

Harrison, BENJAMIN (1833-1901). President of the U.S.A. Born at North Bend, Ohio, Aug. 20, 1833, grandson of President William Henry Harrison, after practising law he joined the Federal army and greatly distinguished himself in the Civil War. Senator 1881-



Benjamin Harrison
U.S. President

87, he was elected president on the Republican ticket in 1888, his opponent being Grover Cleveland. During his term of office the treaty for the annexation of Hawaii was negotiated, afterwards withdrawn by Cleveland when president; the first Pan-American Congress was held, the McKinley tariff introduced, and the Bering Sea seal

fisheries controversy with Great Britain settled by arbitration.

Defeated in his candidature for re-election, he abandoned politics for the law. In 1899 he was counsel for Venezuela in the boundary arbitration commission set up to examine the claims of Great Britain, and took part in the Peace Conference at The Hague, May 18, 1899. Harrison died at Indianapolis, March 13, 1901. He was the author of *This Country of Ours*, 1897, an account of the administrative organization of the U.S.A. *Consult Life*, Lew Wallace, 1888; *The Presidents of the United States*, ed. J. G. Wilson, 1894.

Harrison, FREDERIC (1831-1923). A British author and publicist. Born Oct. 18, 1831, he



Frederic Harrison,
British writer
Russell

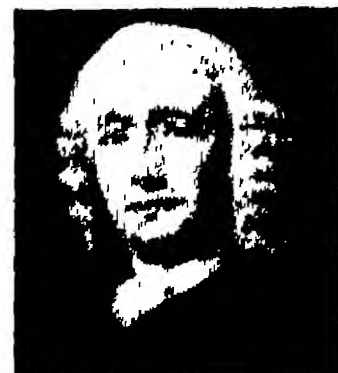
was educated at King's College, London, and Wadham, Oxford, where he became a fellow. Called to the bar 1858, he was a member of the royal commission on trade unions, 1867-69, and from 1877 to 1879 professor of jurisprudence at the Inns of Court. He was a founder of English Positivism, president of the English Positivist committee, 1880-1905, and wrote many books on the subject. His great literary output included, among historical works, *The Meaning of History*, 1862, enlarged ed. 1894; *Lives of Oliver Cromwell*, 1888, and *William the Silent*, 1897; *Byzantine History in the Early Middle Ages*, 1900; and, on literary subjects, *The Choice of Books*, 1886; *Victorian Literature*, 1895; a life of Ruskin, 1902. His *Autobiographic Memoirs* appeared in 1911. Died Jan. 14, 1923.

Harrison, GEORGE BAGSHAW (b. 1894). British scholar. Born July 14, 1894, he was educated at Brighton College and Queens' College, Cambridge. He was an army officer in India and Mesopotamia, 1914-19, afterwards becoming a schoolmaster. He was lecturer in English literature, King's College, London, 1927-9; professor of English at the university of Chicago, 1929; reader in English literature, university of London, 1929-43; and became professor of English at Queen's University, Kingston, Ontario, 1943. An outstanding student of the Elizabethans, he published editions of and works on Shake-

speare, an edition of the Letters of Queen Elizabeth, and Elizabeth and Jacobean Journals covering 1591-1606.

Harrison, JOHN (1579-1656). English philanthropist. Born in Leeds, he was left a fortune by his father which he applied to the purchase of land in Leeds. He rebuilt the free grammar school; put up a cross in the market-place, and built S. John's church, erecting an almshouse near it which he endowed. He was one of eight Leeds citizens who purchased the manor from the crown. A staunch royalist, his estates were sequestrated at the close of the Civil War. There is a statue of him in the City Square, Leeds. He died Oct. 29, 1656.

Harrison, JOHN (1693-1776). An English clockmaker. Born at Foulby, Yorkshire, the son of a carpenter, he taught himself the elements of mechanics, and in 1715 made an 8-day clock with wooden wheels, which is still working in the patent museum at S. Kensington. In 1726 he introduced an important improvement with his gridiron pendulum, in which parallel rods of brass and steel contracting and expanding in opposite directions compensated for differences of temperature. In 1736 he produced a ship's chronometer more accurate than any previously made. In 1759 he made a pocket chronometer of remarkable accuracy, which, fulfilling certain conditions laid down by an Act of Parliament of 1713, entitled Longitude Harrison, as he was called, to a reward of £20,000, which was withheld, however, by



John Harrison,
English clockmaker
After King

the board of longitude. Not until 1773 did he receive this money. He died in London, March 24, 1776.

Harrison, MARY ST. LEGER. A British novelist. The younger daughter of Charles Kingsley, she wrote as Lucas Malet (*q.v.*).

Harrison, THOMAS (1606-60). English puritan and regicide. He was born at Newcastle-under-Lyme, Staffs, the son of a grazier and butcher. He became clerk to a London solicitor; in 1642 joined the bodyguard of the earl of Essex, and distinguished himself at Marston Moor. He was in command of the force that took King Charles from Hurst Castle to

London, was one of the court that tried him, and signed the death warrant. During Cromwell's absence in Ireland



Thomas Harrison,
English Puritan
From an old print

Harrison was in supreme military command in England, 1650-51.

He took part in the expulsion of the Long Parliament in 1653, in which year came the division of the

Commonwealth party into the Fifth Monarchy idealists under Harrison and the more practical men under Lambert. The latter gained the upper hand, and Harrison lost his offices and commission, and twice suffered imprisonment for his loyalty to his views. He was one of the most consistent and resolute of the Parliamentarians, and though one of the seven regicides excluded from the Act of indemnity, refused to flee the country at the Restoration or to acknowledge Charles II. He was taken, tried, and executed on Oct. 13, 1660. *Consult* Thomas Harrison, Regicide and Major-General, C. H. Simpkinson, 1905.

Harrison, William (1534-93). English topographer. Born in London, April 18, 1534, he was educated at St. Paul's and Westminster schools, and 1556 graduated at Oxford. He became rector of Radwinter, Essex, in 1559. At the suggestion of Reginald Wolfe, printer to Elizabeth, he wrote the Description of England, 1577, a vividly actual and most valuable account of the country in the time of Elizabeth. Harrison was appointed in 1586 dean of Windsor, where he died in April, 1593. Much of his work is in Shakespeare's England, edited by F. J. Furnival, 1877-78.

Harrison, William Henry (1773-1841). President of the U.S.A. Born at Berkeley, Charles City co., Va., Feb. 9, 1773, he entered the army and fought with distinction against the N.W. Indians. In 1801-13 governor of Indiana territory, he was responsible



W. H. Harrison

for several treaties with the Indians, one of which, involving a large cession of territory to the



Harrogate. Air view of the Valley Gardens, a beautiful central feature of this famous Yorkshire inland spa

U.S.A., indirectly led to the war with Great Britain in 1812. Harrison was appointed to the command in the north-west, and his defeat of a combined force of British and Indians on the Thames, Ontario, Oct. 5, 1813, and other successes, gained him a reputation during the war second only to that of Andrew Jackson.

Member of Congress, 1816-19, and senator, 1825-28, he was an unsuccessful candidate for the presidency in 1836, but was elected in 1840 in what became known as the "log-cabin and hard cider" campaign, in allusion to his once having lived in a log-cabin and to his preferring cider to beer. He died at Washington a month after his inauguration, April 4, 1841. *Consult* Lives of the Presidents, W. O. Stoddard, 1888-89; The Presidents of the United States, ed. J. G. Wilson, 1894.

Harris Tweed. Cloth made from pure wool, produced in the Outer Hebrides. It is spun, dyed, and finished, and handwoven in their homes by the islanders of Lewis, Harris, Uist, Barra, etc. Cloth made of yarn spun on the mainland may be sold as Harris tweed, but it must not be stamped with the trade mark registered with the board of trade, 1934.

Harrogate. Borough, spa, and inland resort of Yorkshire (W.R.), England, much used as a conference centre. It is 19 m. W. of York. Harrogate is noted for its springs; the first was discovered in the 16th century. Later discoveries brought the number up to 88: they give chalybeate, sulphurous, or limestone waters. There is a fine spa establishment equipped

for the treatment of rheumatic disorders, and a number of good modern buildings. The Stray is a large open space.

The Valley Gardens are noted for their floral displays; and there are many other public gardens. Near the town are many places of historic interest.



Harrogate arms

Harrogate was originally two villages, Low and High Harrogate. It was made a bor. in 1884, and gives its name to a co. constituency. Pop. (1951) 50,465.

Harrow. Implement used in agriculture for the same purpose as the garden rake in horticulture. It is drawn by a horse or horses, or by a motor. With its large clods of earth rendered friable by the weather are broken down. It reduces the soil to a sufficient fineness for seed, which it then covers to the required depth. Seed harrows are usually constructed of iron with long or short tines according to the character of the soil on which they are used. In some cases the tines are arranged in a zigzag pattern to ensure maximum soil movement, rather than on the square fashion where the tines follow one another in a series of lines. Drag harrows have curved tines and are used on heavy soils, and on those not well mellowed by the weather. Chain harrows, which are flexible with very short tines or may be merely a series of chains, when drawn over grassland remove weeds, open up matted growth to aeration, and distribute the droppings of livestock.



Harrow, Middlesex. The High Street and the parish church, the spire of which is a landmark for many miles

Harrow. Borough of Middlesex, England, incorporated in 1954. It includes Harrow-on-the-Hill, Pinner, Hatch End, Stanmore, Harrow Weald, and Wealdstone, and is 10 m. by road N.W. from Hyde Park Corner. It is served by London Transport and main line rly. It forms three borough constituencies. Pop. (1951) 219,494.

The Hill of Harrow stands 407 ft. above sea-level, and is from 200–250 ft. higher than the plain around. The parish of Harrow-on-the-Hill retains much of its old character and contains an inn, the King's Head, dating from 1553. Much of the parish church of S. Mary, founded by Lanfranc and consecrated by Anselm 1094, was rebuilt in the 14th century; it was restored by Sir Gilbert Scott in 1840. It contains old brasses, among them one to John Lyon, founder of Harrow School, and his wife, 1592. The glass in the clerestory windows illustrates the history of the parish church and school. The lead-encased wooden spire is a landmark for miles.

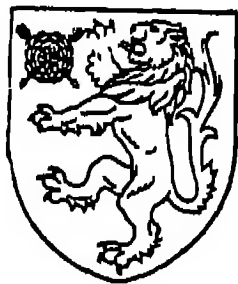
The manor, anciently called Herges, belonged to the archbishops of Canterbury as early as the 9th century; it became Harwe-at-Hill in the 14th. Cranmer in 1543 exchanged it for other lands with Henry VIII, who in 1546 granted it to Sir Edward, afterwards Lord, North whose family held it until 1630.

At Harrow and Wealdstone station occurred on Oct. 8, 1952, one of the worst British rly. accidents; it involved three passenger trains, and 112 lives were lost.

Harrow School. English public school. Originally attached to the local church, it was threatened with extinction by the confiscation of ecclesiastical lands in 1547, but was saved by John Lyon, a neighbouring landowner, who secured a charter in 1572 to

endow the institution and set it on its feet again. The endowment began to operate in 1608, when a new building was erected and the school re-established under Lyon's statutes as a free grammar school. Under these statutes forty local free pupils were to be received; but the headmaster

was permitted to take as many other boys as he liked and to charge fees for their tuition. Lyon's intention that the school should be national rather than local was also indicated by his provision for the upkeep of the roads leading from London to Harrow.



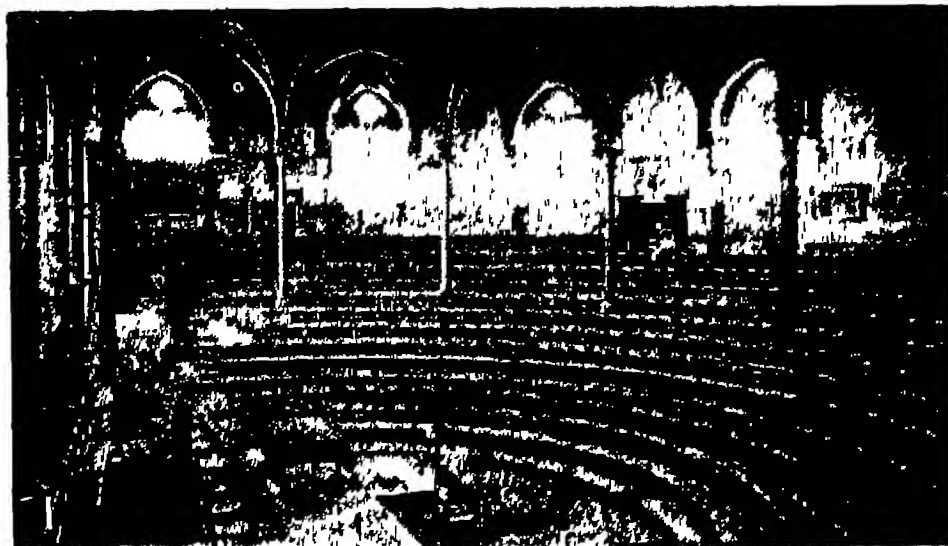
Harrow School arms

A century later the number of pupils from outside the district was more than double that of the free scholars. Educational, political, and social developments caused it to rise in reputation in the 18th century. During the 19th century, through the generosity of Old Harrovians, a number of buildings, including the chapel, Vaughan library, speech room, science schools, museum, art and music schools, and the workshop, were erected, and extensive playing fields were acquired. From the same source came many entrance and leaving scholarships. The institution was one of the nine public

schools recognized by the Public Schools Act, 1868.

The number of pupils varies between 500 and 600. The school is organized into five blocks, each of which is divided into forms for administrative purposes and for the teaching of compulsory subjects, but instruction in optional subjects is given in divisions. The upper school, including the sixth and upper fifth forms, is arranged in groups which specialise in various studies, ancient and modern. Since the time of John Farmer (organist from 1862 to 1885), Harrow has been famous for its music, and it possesses a large collection of songs enshrining its traditions. Among its headmasters have been Benjamin Heath, George Butler, C. J. Vaughan, H. M. Butler, J. E. C. Weldon, Lionel Ford, and Sir Cyril Norwood. Its pupils have included Sheridan, Byron, Peel, Palmerston, and Winston Churchill, Field Marshal Lord Gort and Field Marshal Lord Alexander.

Hart, Sir Robert (1835–1911). British administrator. Born at Portadown, co. Armagh, Feb. 20, 1835, and educated at Queen's College, Belfast, he entered the British consular service in China, 1854. Invited by the viceroy of Canton to undertake the supervision of the customs in 1859, Hart resigned from the British consular service and organized the Chinese imperial maritime customs service, of which he became inspector-



Harrow School. 1. Interior of the Speech Room. 2. Some of the school buildings, showing chapel on right, and part of the old school, left background

general in 1863. About this time he met Gordon, the two men becoming friends. Only on two occasions, 1866 and 1878, did he revisit Europe before retiring from office in 1908.

His thorough knowledge of the Chinese language, his absorption of

the Chinese point of view, and his resolute administration of the service for the benefit of China, won the confidence of the Chinese government, and the success of his department brought him the additional charge of the lighting of the coast and inland waterways and of the imperial



Sir Robert Hart,
British administrator
Elliott & Fry

post. In 1906 the Chinese government placed the customs service under a board of Chinese officials, and in Jan., 1908, Hart, nominally president of the board, received formal leave of absence and returned to England. He was created a baronet in 1893, and died near Great Marlow, Sept. 20, 1911.

Hartal (Hindu, the locking of shops). Term applied to a day of national protest in India when all shops and mills are shut as a form of boycott for political purposes. It was first used in this sense by Gandhi (*q.v.*) as part of his campaign for Indian independence from Great Britain, and frequently led to serious rioting.

Hart Dyke, SIR WILLIAM (1837-1931). A British politician. The son of a Kentish baronet with a title dating from 1679, he was born Aug. 7, 1837. Educated at Harrow and Christ Church, Oxford, he was Conservative M.P. for West Kent, 1865 and 1868-85, for Dartford, 1885-1906. He was chief secretary for Ireland, 1885-86, and from 1887 to 1892 was vice-president of the committee of council, on education. He succeeded to the baronetcy in 1875. He died July 3, 1931.

Harte, FRANCIS BRETT (1839-1902). An American novelist and poet. Born at Albany, N.Y., on Aug. 25, 1839, he went at the age of 18 to California, where he spent three years as a gold miner and school-master. He became editor of The



Brett Harte

Weekly Californian, in which he published his admirable parodies, the Condensed Novels. In 1868-70 he edited The Overland Monthly, for which he wrote the imitable verses on The Heathen

Chinese and many of his most famous short stories, including The Luck of Roaring Camp, The Outcasts of Poker Flat, Miggles, and Tennessee's Partner.

During 1878-85 he held consular appointments at Krefeld in Germany, and at Glasgow. From 1885 onwards he lived at Camberley, England, producing many novels and short stories, but none quite equal to his early studies. He died at Camberley, May 5, 1902. His Collected Works, 1904, occupy 20 vols. *Consult* Lives, T. E. Pemberton, 1903; H. W. Boynton, 1905; H. C. Merwin, 1911.

Hartebeest (*Bubalis*). Genus of large antelopes, found in S. Africa. The name is Dutch and is derived from the supposed resemblance of the animal to a stag. The hartebeest is one of the swiftest of the antelopes; is about 4 ft. high at the withers; is reddish brown or bay in colour; and has ringed horns which first diverge from the forehead like a V and then turn backwards at right angles. There are probably four species, with various local races. See Animal; Antelope.

Hart Fell. Mountain in Scotland. On the borders of Dumfriesshire and Peeblesshire, it is 6 m. N.E. of Moffat. Its height is 2,651 ft.

Hartford. City of Connecticut, U.S.A. Capital of the state and co. seat of Hartford co., it stands on the Connecticut river at the head of navigation for large ships, 125 m. W.S.W. of Boston, and 110 m. N.E. of New York. It is served by the New York, New Haven, and Hartford and other rlys., and by two airports, several excellent highways which enhance its central location, and three radio stations. As it flows into the Connecticut the Little Park R. divides the city approximately in half. The Talcott Mt. range is 6 m. W. of the city. A 9-span granite bridge over the Connecticut, constructed 1907, 1,192½ ft. long, 82 ft. wide, has the largest mass of any purely stone bridge, and is one of the largest cut-stone masses in existence. Hartford is an eminently beautiful city. It has 2,710 acres of parks and public squares. Among a number of imposing buildings are the white marble capitol, the state library and supreme court building, the

state office building, the arsenal and armoury, the Old State House, a colonial structure built in 1796, the Travelers Insurance company skyscraper with its tower soaring 527 ft., the Bushnell memorial auditorium, which seats 3,300, and the Junius S. Morgan memorial, which was built by the late J. P. Morgan Sr. in memory of his father, who started as a merchant here, and which contains a notable portion of the J. P. Morgan art collection. Hartford is the see of R.C. and Protestant Episcopal bishops. Educational institutions include Trinity college, the Hartford seminary foundation, and the Hartford college of law. The Hartford Courant, founded in 1764,

is the oldest newspaper published in the U.S.A.

Hartford is a port of entry, but is chiefly important as an insurance centre. The first automobile insurance policy was issued here. Its manufactures include typewriters, small arms, aircraft engines, automobile parts, mechanical counters, precision machines, marine and other types of engines, electrical and telephone equipment, printing machinery, and brushes. The first

woollen mill in New England was established here in 1788.

The site of a Dutch trading post and fort in 1623, Hartford became the first permanent white settlement in Connecticut when the Rev. Thomas Hooker and the Rev. Samuel Stone brought migrants from Massachusetts here in 1636. At first called Newtown, it later received its present name in honour of Hertford, England, Stone's birthplace. Connecticut Colony's first general court met here in 1636, and a constitution was adopted here three years later. In 1682 the colonies of Connecticut and New Haven were united with Hartford as capital. In 1701 New Haven became a joint capital, continuing until 1873, when Hartford again became the sole seat of government. It was an important supply centre for the American army during the revolution, and in 1780 Washington and Rochambeau laid their plans for Yorktown here. In 1814 the Hartford convention (Massachusetts, Connecticut, Rhode Is., New Hampshire, and Vermont) met here to voice the resentment of New England



Hartebeest. Specimen
of *Bubalis caama*

federalists at the prosecution of the war of 1812, which was ruining the region's trade and, in general, to assert New England's interests against the alleged encroachments of the W. and S. It received a city charter in 1784. At the end of the 18th century, the Hartford Wits, a group of literary amateurs, flourished here. Noah Webster, the lexicographer, was born here, and eminent writers who have lived at Hartford include Whittier, Harriet Beecher Stowe, Mark Twain, and C. D. Warner. Pop. (1950) 177,397.

Hartington, MARQUESS OF. Title borne by the eldest son of the duke of Devonshire. The 8th duke of Devonshire (*q.v.*) achieved political distinction under this name. Hartington is a village in the Peak dist. of Derbyshire.

Hartland, HENRY ALBERT (1840-93). British painter. Born at Mallow, co. Cork, on Aug. 2, 1840, Hartland worked for a time painting stage scenery in Dublin. His best work was in water-colour, his favourite subjects being the moorland scenery of Ireland and N. Wales. He spent most of his working life at Liverpool. He was a frequent exhibitor at the R.A. from 1869. Examples of his work are to be found in the Victoria and Albert Museum and the Walker Art Gallery, Liverpool. He died at Liverpool, Nov. 28, 1893.

Hartland Point. Headland on the N. coast of Devon, England. Forming the S.W. extremity of Barnstaple Bay, it is 350 ft. high. Here is a lighthouse with a revolving light visible for 17 m.; and Royal Greenwich Observatory station for magnetic observations, which was transferred here from Abinger, Surrey, in 1957.

Hart Leap Well. Locality in the N. Riding of Yorkshire, England, between Richmond and Leyburn. The story is that a stag, having been hunted for 13 hours, here leaped down from the fell and died. A tree which was planted there would not grow, and no beast would drink from the well. Wordsworth has a poem with this title.

Hartlepool. Mun. bor. of Durham co., England. It stands on a headland on the coast of Durham, 247 m. from London and 18 m. from Durham by



Hartlepool arms

rly. The chief buildings are the church of S. Hilda, dating from the 12th century, with its great tower, and the town hall, a

modern building in the Italian style. The chief industries are engineering, shipbuilding, and shipping. There is a large fishing trade, for which there is a commodious fish quay, and much of the docks is used for timber imports. The town has a service of buses, connecting it also with W. Hartlepool.

Hartlepool originated round a monastery founded about 640. It obtained some municipal privileges from King John, and was a fortified place, there being still many remains of its walls and the Sandwell gate. It was made a borough in 1593. In the Middle Ages and later it had large markets and fairs, and is now a flourishing seaport. It is governed by a mayor and corporation. Pop. (1951) 17,219. Known as the Hartlepoons. Hartlepool and W. Hartlepool unite to form one bor. constituency. See West Hartlepool.

Hartlepoons, BOMBARDMENT OF THE. German naval operation in the First Great War, Dec. 16, 1914. Early in the morning of Dec. 16, 1914, a German battle-cruiser squadron under the command of Vice-Admiral Hipper appeared off the N.E. coast of England and shelled the Hartlepoons, Whitby, and Scarborough. The enemy vessels engaged were the battle cruisers Derfflinger, Seydlitz, and Moltke, Von der Tann, the armoured cruiser Blücher, and certain light cruisers and destroyers. Bombardment of the Hartlepoons began at 8.15 a.m. and lasted until 8.50 a.m. Three cruisers got within a range of 4,000 yds., and escaped almost undamaged although the coastal batteries, the light cruiser Patrol, and two destroyers, Doon and Hardy, fired at the enemy.

It was estimated that the German ships fired 1,500 shells. Some 500 houses were hit, as well as important buildings, including the railway station, waterworks, gasometer, and a battery. Civilian casualties were 113 killed, including 30 women and 15 children, and 300 wounded; military casualties were seven killed, 14 wounded—first war casualties suffered on English soil through a foreign enemy since the Norman conquest. The excuses of the government did little to allay public anger that enemy ships could thus approach with impunity to within 3 m. of the shore.

Hartley, SIR CHARLES AUGUSTUS (1825-1915). British engineer. Born at Heworth, Durham, he became a railway engineer. During the Crimean War he served as an

engineer with the Turks. This led to his appointment as engineer-in-chief to the international commission that controlled navigation of the Danube, and in 1892 he was made its consulting engineer. In 1867 he won a prize offered by the tsar for a plan to improve Odessa Harbour, and he was consulted about river and harbour prospects all over the world, including the Mississippi and the Scheldt. Durban and Trieste. He was on the commission for the improvement of the Suez Canal. Knighted in 1862, he died on Feb. 20, 1915.

Hartley, DAVID (1705-57). English physician and philosopher. Born Aug. 30, 1705, and educated at Jesus College, Cambridge, he was led by conscientious scruples to abandon his intention of taking Holy Orders. He became a successful physician, finally settling at Bath, where he died Aug. 28, 1757. His chief work is *Observations on Man, his Frame, his Duty, and his Expectations*, 1749. In this he explained the workings of the mind as due to certain tiny vibrations or "vibratiuncles," working both inwards and outwards by way of the nerves, according as the disturbing cause was an external object or an internal impulse. The founder of the Associationist psychological school (see Association of Ideas), he attached special importance to the law of succession and simultaneity. Consult Hartley and James Mill, G. S. Bower, 1881.

Hartmann, KARL ROBERT EDUARD VON (1842-1906). German philosopher. Born in Berlin, Feb.



23, 1842, the son of a Prussian general, for five years he held a commission in the Guards-Artillery, but was forced in 1865 to retire on account of a neuralgic affection of the knee which made him a cripple. After a period of study he published, in 1869, his work on *The Philosophy of the Unconscious*, 10th ed. 1890, Eng. trans. W. C. Coupland, 1884; 2nd ed. 1904. His *Modern Psychology*, 1903, is an account of the progress of psychological study in Germany in the second half of the 19th century. His other works include *German Aesthetics* since Kant, 1886; *The Religion of the Future*, Eng. trans. E. Dare, 1886; *The Sexes Compared and Other Essays*, Eng. trans. A. Kenner,

1895; and *The Philosophy of the Beautiful*, 1887. He died at Lichtenfelde, near Berlin, June 5, 1906.

Hartmann was a monist. His *Philosophy of the Unconscious* is based on an amalgamation of Schopenhauer's doctrine of will with the metaphysic of Hegel and the positiveness of Schelling. Logical thought and illogical will are merged in the unconscious, i.e. in the one and universal unconscious mind which animates the world. Unlike Schopenhauer, Hartmann denies that will can exist without willing something definite, which is thought or idea. Mind and matter are objectifications. Nature's restorative and reproductive powers are unconscious, as are reflex action and instinct. Consciousness came to life in man, and with it an idea of wretchedness to which the lesser animals are strangers. From this idea man has sought relief in a belief in worldly happiness, faith in a hereafter, and trust in the ameliorative agencies of education and science. The greater part of the will perceives the inevitable misery of existence, and finally man will seek the peace of non-existence. *Consult* Pessimism, J. Sully, 1891.

Hartmann von Aue (c. 1165-1210). German Meistersinger. A Swabian knight, known to have joined in one of the Crusades. He was the author of two Arthurian epics, *Erec* and *Iwein*, which greatly influenced German medieval poetry, and of two religious narrative poems, *Gregorius*, a legend of the early life of Pope Gregory the Great, and *Der Arme Heinrich* (Poor Henry), a tender romance of love and faith based on the legend which Longfellow also used in his *Golden Legend*.

Hartshorn. Popular name for ammonia water, ammonium carbonate. The name originally referred to the preparation made by distillation from the antlers of the red deer, *Cervus elaphus*. The products of distillation have now been replaced by ammonia preparations. See *Ammonia*.

Hart's-tongue Fern (*Scolopendrium vulgare*). Fern of the family Polypodiaceae. It is a native of Europe, N. Africa, Asia, and N. America. The rootstock is short and broad, clothed with slender brown scales; the fronds, 1 ft. to 3 ft. long, are undivided, leathery, and strap-shaped, with a heart-shaped base. The spore clusters are in thick parallel lines at right angles to the thick mid rib.

Hart - Truffle (*Elaphomyces granulatus*). Subterranean fungus of the family Ascomycetes. It is

a yellow tuber of depressed spherical form, attached to the roots of conifers, and filled, when ripe, with a purplish-brown mass of spores. Its presence beneath the soil is indicated above it by the clubbed stems of another fungus, *Cordyceps capitata*, which is parasitic upon the hart-truffle.

Harty, SIR HERBERT HAMINGTON (1880-1941). Northern Irish composer and conductor. Born at Hillsborough, Down, Dec. 4, 1880, he received his early musical education from his father and at the age of 12 was organist at Magheracoll, Antrim, later holding similar posts in Belfast and Dublin. In 1900 he moved to London.



Sir Hamilton Harty, British composer and conductor

He achieved celebrity first as a sensitive accompanist, then as a conductor, notably with the London Symphony orchestra. For 13 years from 1920 he was director of the Hallé orchestra at Manchester. Of his compositions the best known are, perhaps, *The Mystic Trumpeter* and *With the Wild Geese*. He arranged many Irish folk-songs and set Irish poems to music of a delicate charm. He married in 1904 Agnes Nicholls, a soprano. He was knighted 1925, and died Feb. 19, 1941.

Hartzenbusch, JUAN EUGENIO (1806-80). A Spanish dramatist. Born at Madrid, Sept. 6, 1806, of German origin, he worked as a carpenter for some years and then became a journalist. After making several translations and adaptations of French and Spanish dramas, he produced *Los Amantes de Teruel* (Teruel's Lovers), 1837. A later success was *La Jura en Santa Gades*, 1845. He published critical editions of Calderon and others, and *Cuentos y Fabulas* (Stories and Fables) in 1861. He died at Madrid, Aug. 2, 1880.

Harpisces. In ancient Rome, diviners or soothsayers who drew omens from examination of the



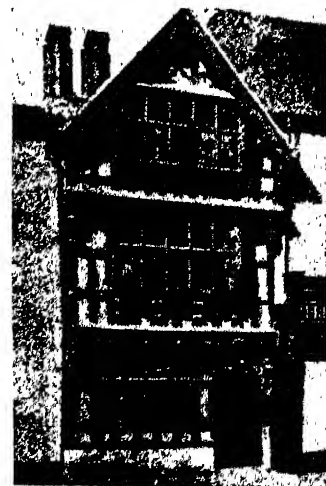
Hart-Truffle, with clubbed stems of its parasite

entrails of slaughtered animals. They also observed the manner in which the victim went to its death, the character of the flames in which it was consumed, and of the meal, wine, etc., used in the sacrifice; and suggested propitiations for divine wrath after portents and thunderstorms. The emperor Claudius formed them into a college which existed until the 5th century.

Harvard. Lofty peak of the Rocky Mts., in Lake co., Colorado, U.S.A. One of the College peaks, it attains an elevation of 14,376 ft. above the level of the sea. It is about 110 m. S.W. of Denver.

Harvard, JONAS (1607-88). English puritan, and one of the founders of Harvard university (v.i.). Born in Southwark, London, he was a son of Robert Harvard (d. 1625), a prosperous butcher, was baptized in St. Saviour's, Nov. 29, 1607, and educated at the local grammar school and at Emmanuel College, Cambridge. He was married, April 19, 1636, at South Malling, to Anne Sadler, of Ringmer, Sussex. In 1637 he went to America, was admitted, Aug. 6, a townsman of Charlestown, Mass., and became second minister of the church there. Dying Sept. 24, 1638, he left his books (all but one of which were destroyed by fire in 1764) and half of his estate to a college which had been chartered in 1636 in the hamlet of Newetowne, renamed Cambridge. The college was named Harvard College.

In 1638 a granite obelisk was erected to Harvard's memory at Charlestown; in 1904 a memorial tablet was placed in Emmanuel College; in 1905 the chapel of St.



Harvard House, Stratford-on-Avon, built by John Harvard's grandfather and restored in 1909

John the Divine, in S. Saviour's, was restored by Harvard men and renamed Harvard Memorial Chapel. Harvard's mother, Katherine Rogers, was a native of Stratford-on-Avon, and, it is suggested, was introduced to his father by Shakespeare. Harvard House, Stratford-on-Avon, built by the father of Katherine Rogers, was restored at the expense of Edward Morris, of Chicago, and opened Oct. 6, 1909, as a rendezvous for Americans visiting England, and a repository of records, relics, etc., of the Elizabethan period. Consult John Harvard and His Times, H. C. Shelley, 1907.

Harvard University. Senior seat of learning of the U.S.A. It was established by the general

developed as outgrowths of earlier foundations, include architecture, landscape architecture, engineering, and city and regional planning.

In addition, the university includes, among other related institutions, Harvard College library, central unit in a university library collection of more than 4,700,000 volumes; the Arnold arboretum, Gray herbarium, Farlow library and herbarium, and Harvard forest; the astronomical observatory with branches in Cambridge and Harvard, Massachusetts, and Bloemfontein, South Africa; extensive laboratories of chemistry, biology, physics, and psychology; the museum of comparative zoology and Peabody museum; the Fogg art museum; the Dumbarton Oaks research library and collection of Byzantine and medieval humanities; and the Harvard university press.

Originally set up under the joint control of state and church, Harvard university is now a privately endowed institution making no religious tests for admission. Enrolment figures before the Second Great War showed approximately 8,300 students in residence in all departments, of whom about 3,750 were undergraduates in the college. Enrolment for the

academic year 1955-56 was 10,406 (in 1946-47 it was 12,000). More than 125,000 students have graduated here since the institution was founded. Consult Development of Harvard University, 1869-1919, ed. S. E. Morison, 1930.

Harveian Society. A British medical organization founded in London, Sept. 15, 1831, for the study and discussion of new trends in medical practice and to advance the status of the medical practitioner. In 1875 the society endowed a lecture which is delivered each March by a distinguished member of the profession. Since 1927 it has offered annually a prize and medal for the best essay on a subject of medical interest. The affairs of the society, which has some 300 members, are governed by a council of 20. Its address is 11, Chandos St., London, W.1. There are Harveian Societies in Edinburgh and New York.

Harvest (A.S. *haerfest*, crop). The final stage in securing crops, especially cereals. Among the

main cereals barley is allowed to remain standing until the grain is fully ripe, whereas oats and wheat may be cut before this stage without detriment to their feeding or milling quality. Except on a very limited scale the sickle and scythe are now superseded by the reaping machine, the self-binder, and the combine harvester which cuts the crop and threshes the grain simultaneously. See Farm.

The straw may be baled directly or left on the ground until it can be picked up and baled; it may, however, be left on the ground and burned where it lies. If a self-binder is used the sheaves are usually stooked and left for a time, then either stacked in the open or in Dutch barns near the farmstead where the straw can be readily handled for livestock. Beans are commonly cut by a self-binder like cereals, but peas are cut by a pea hook and allowed to dry on the ground, being turned as necessary until fit to stack.

Harvest Bug OR **HARVEST MITE.** Names given to mites of the family Trombididae, a red spider group. The British species (*Trombicula autumnalis*) is bright red and hairy. It frequents grassy places where there is rank vegetation, and the adults are believed to feed on decaying matter in the soil. It makes its presence noticeable with the cutting of the corn—hence its name. Its young form, or larva, attaches itself to man and other animals, burrowing under the skin and causing severe irritation which can be temporarily relieved by bathing with ammonia; flowers of sulphur dusted in the shoes enters the blood-stream and kills the creatures.



Harvest-Bug, greatly enlarged

Harvest Customs. Ceremonies and celebrations associated with the completion of the gathering in of harvest. Of immemorial antiquity and world-wide distribution, they originated in worship of the nature deities associated with the growth of crops. Among the Romans the Cerealia were feasts in honour of Ceres, and many widely disseminated customs are linked with the classical legends of Demeter and Persephonē.

One custom which, with but slight variations, can be traced among widely separated peoples,



Harvard University. Students in the Harvard "Yard," so called because the site of the main university buildings was formerly a knacker's yard. In the background is Memorial Hall, built in 1878

court of the Massachusetts Bay colony in 1636, in Newetowne, Massachusetts, just outside Boston. The first master was appointed a year later, when the name of the town was changed to Cambridge in memory of the university in England which many leaders of the Bay Colony had attended; the institution was named Harvard College in memory of John Harvard (v.s.). The first class graduated in 1642, the first scholarship fund was established in 1643, and the college was incorporated by charter in 1650. Degrees in divinity were first conferred in 1692. The first professorships in medicine were established in 1782. Separate faculties and schools in the various professional fields were later established as follows: medicine, 1810; divinity, 1816; law, 1817; applied sciences, 1847; dentistry, 1867; business administration, 1908; public health, 1913; education, 1920; public administration, 1935. Other faculties,

is the forming of a crude figure—sometimes merely a handful of corn decorated—which is borne in procession as a personification of the crop and made the central figure of the festivities. This custom still survives in parts of England and Scotland, where a harvest doll or kern, i.e. corn baby, is fashioned from some of the best corn into the semblance of a human figure, dressed up, and carried with the last wagonload of the harvest.

In Scotland, the last sheaf, called the Maiden or the Old Woman, according to whether it is cut before or after Hallowmas, is kept till Christmas morning, when it is distributed to the cattle to give them health throughout the next year, or is hung up until replaced by its next year's successor. Similar customs are recorded in various European countries.

Another immemorial custom is the harvest supper given by the owner of the crop to all who help to garner it. The Jews feasted at the getting-in of harvest and made a thank-offering of the first fruits, and among heathen peoples the heads of families feasted on terms of equality with their servants. In England the supper was the crowning celebration of the harvest home, and from the fact that a goose was the principal dish on these occasions originated the custom of eating a goose on Michaelmas Day. *Consult The Golden Bough*, J. G. Frazer, 1917 edn.

Harvester or **HARVESTMAN**. Any member of the order Phalangidae, a group of the class Arachnida to which also belong the spiders, scorpions, and mites. Harvesters are long-legged and quite harmless, and prey upon small spiders and mites. They are quite distinct from the harvest bug (q.v.).

Harvest Festival. Service in the Christian churches of thanksgiving for the safe ingathering of the harvest. It is not a fixed occasion, but is chosen from year to year to fit in with the actual date of the harvest. The congregation decorate the church with offerings of corn, fruit, and vegetables—in the country from their own fields and gardens.

Harvest Moon. Nearest full moon to the autumnal equinox, Sept. 23. Owing to the position of the moon's path with respect to the horizon, it rises nearly at the same time on successive evenings. Traditionally, farmers take advantage of the succession of moonlight evenings occurring at this time of the year to gather their harvest. *See Moon*.

Harvey, GABRIEL (c. 1545–1630). English scholar. Born at Saffron Walden, son of a well-to-do rope-maker, he had a distinguished career at Pembroke College, Cambridge. He advocated the use of classical metres in English verse, was the friend of Spenser (he was the Hobbinol of *The Shepherd's Calendar*), and carried on a bitter quarrel with Thomas Nashe (q.v.). He died at Saffron Walden, Feb. 11, 1630. *Consult his Marginalia*, ed. G. C. Moore Smith, 1913.

Harvey, SIR GEORGE (1806–76). Scottish painter. Born in Feb., 1806, at St. Ninian's, Stirlingshire, he studied at the Trustees' academy, Edinburgh. He was an original associate of the Scottish academy, 1826, becoming a full member in 1829, and president in 1864, in which year he was knighted. He died at Edinburgh, Jan. 22, 1876. He painted Scottish genre, portraits, and landscapes. *See Covenanters*; *Drumclog*.

Harvey, (JOHN) MARTIN. This British actor, who was knighted in 1921, is entered in this work under Martin-Harvey, Sir John.

Harvey, LEONARD AUSTIN (b. 1907). British boxer. A Cornishman, he appeared in the London ring in 1926, becoming heavyweight champion of Great Britain and of the Empire, though qualified to fight in lighter classes. He lost both titles to Jack Petersen in 1934. At 32 he made a "comeback," and when on July 10, 1939, he beat Jock McAvoy he held five titles simultaneously. On June 20, 1942, defending, against Freddie Mills, the light-heavyweight championship of Great Britain, the Empire, and the world, "Len" was knocked out for the only time in his career; but his retirement left him undefeated heavyweight champion of Great Britain and the Empire. He lost only 10 out of 414 contests. In the Second Great War he served in the R.A.F.

Harvey, WILLIAM (1578–1657). English physician, discoverer of the circulation of the blood. He was born at Folkestone, Kent, April 1, 1578, and educated at the King's school, Canterbury, Caius College, Cambridge, and the university of Padua, taking his doctor's degree in physic at Padua and at Cambridge in 1602. He settled in practice in London, and

in 1607 became fellow of the College of Physicians, and in 1609 physician to St. Bartholomew's hospital. In 1615 he was appointed Lumleian lecturer to the College of Physicians;

he first put forward his theories about the movement of the heart and blood, April 17, 1616. He published *Exercitationes Anatomicae de Motu Cordis et Sanguinis in Animalibus*, 1628.

Harvey had been appointed physician to James I in 1618, and in 1632 he received the same honour from Charles I, who was his constant and helpful patron. He accompanied the king on one visit to Scotland, was with him at the battle of Edgehill, and followed him to Oxford, where he remained for three years, and was made warden of Merton College. He returned to London in 1646, and pursued his investigation into the subject of generation which resulted in the publication, in 1651, of his *Exercitationes de Generatione Animalium*, his only other work of first importance. He died in London, June 3, 1657, and was buried at Hempstead, Essex.

Harvey, WILLIAM (1796–1866). British wood-engraver and designer. Born at Newcastle-upon-Tyne, July 13, 1796, he studied under Thomas Bewick, and later, under Benjamin Haydon in London. About 1822 he gave up engraving for design, and produced some facile illustrations for Northcote's *Fables*, Lane's *Arabian Nights*, and Hood's *Eugene Aram*. He died Jan. 13, 1866.

Harvey, WILLIAM HENRY (1811–66). British botanist. Born at Summerville, Limerick, Feb. 5, 1811, he went, after a youth spent in business, to S. Africa, and became colonial treasurer at the Cape. Returning to Ireland on account of his health, he was appointed

keeper of the Herbarium at Trinity College, Dublin. In 1844 he began the publication of his important work on seaweeds, the *Phycology*



After C. Jansen



Sir George Harvey, Scottish painter

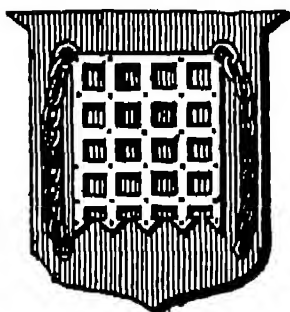


William H. Harvey, British botanist
After Maguire

Britannica. In 1849 he paid a long visit to the U.S.A., and accumulated material for his Contributions to a History of the Marine Algae of N. America, 1852-53. His later works were *Phycologia Australica* (1858-63), *Thesaurus Capensis* (1859-63), and *Index Generum Algarum* (1860). He died at Torquay, May 15, 1866.

Harwell. A hamlet in Berkshire, England, 2 m. W. of Didcot. During the Second Great War a satellite airfield of the R.A.F. station at Abingdon was built here. In 1946 it was converted into an experimental atomic energy plant under the ministry of Supply.

Harwich. Seaport and bor. of Essex. The ancient borough of Harwich comprises Harwich and



Harwich arms

Dovercourt Bay, the two towns being incorporated under a charter of James I. Harwich is a port of importance, Parkeston Quay, 1 m. up the Stour, being the English terminus of passenger and freight services to continental ports, including Hook of Holland, Antwerp, Esbjerg, and Zeebrugge. It stands on a peninsula at the estuary of the Orwell and Stour rivers, 74 m. by rly. N.E. of London.

Harwich's fine natural harbour is completely landlocked and provides safe anchorage for vessels of up to 28 ft. draft, which can lie afloat at all states of the tide. The harbour is easily accessible under all weather conditions, and during the two Great Wars was an important but vulnerable base for minesweepers, submarines, and destroyers. The chief buildings are the church of S. Nicholas and the guildhall. Harwich gives its name to a county constituency.

Dovercourt Bay, a modern residential seaside resort, adjoins Harwich, to the W. It has many

attractions for visitors, including yachting and excellent sandy beaches, with a 3 m. promenade facing due S.

During the Second Great War the borough of Harwich had 1,200 air raid alerts, 1,750 bombs being dropped on it or into the adjacent sea. Pop. (1951) 14,009.

Harwood, Sir Henry Harwood (1888-1950). British sailor. Born Jan. 19, 1888, he entered the R.N. in 1904 and served throughout the First Great War as a lieutenant. In 1928 he was promoted captain and appointed to command the 9th destroyer div. On the staff of the Royal Naval War College, 1934-36, in 1936-39 he was commodore commanding the S. America div. and H.M.S. Exeter, and in Dec., 1939, led the cruisers Ajax, Achilles, and Exeter in the action which resulted in the destruction of the German pocket-battleship Graf Spee, as a result of which he was made K.C.B. and promoted rear-admiral, 1940. In 1942 he was appointed naval c.-in-c. Mediterranean, and the following year was appointed vice-admiral and made c.-in-c. the Levant. Retiring in 1945, with the rank of admiral, he died June 12, 1950. See Plate, Battle of the.



Sir Henry Harwood, British sailor

Harz. Mountain range of N. Germany lying between the Leine and the Saale and crossed by the waterparting between the Weser and the Elbe. The existing heights are the remains of an ancient and more extensive system of fold mountains which were uplifted during the period when the coal measures were under formation.

The Harz consists of carboniferous and older rocks with intrusive

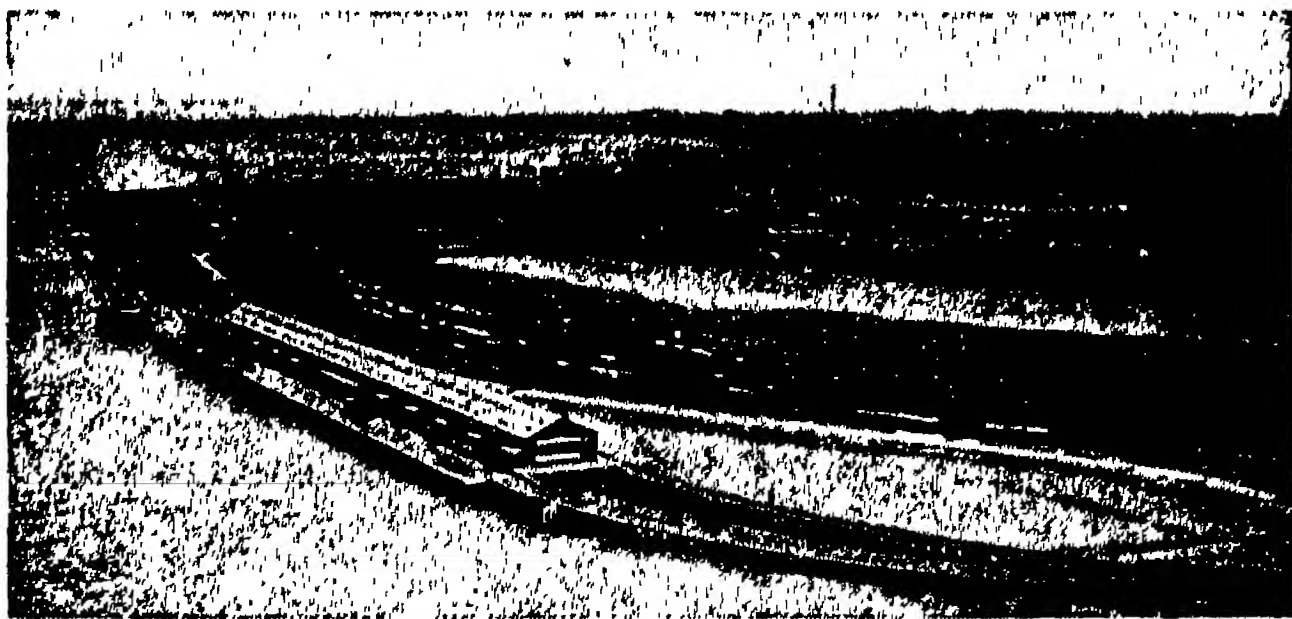
granites; the Brocken, 3,730 ft., the highest point, being the largest granite mass. North of the range outlying hills lead to the lowland of N. Germany; the drainage is by the Ocker and other streams to the Weser; to the S. lies "Golden Meadow," valley of the Helme, tributary of the Saale.

The range, 56 m. by 20 m., comprises the Upper Harz, a thickly forested district where at Clausthal and other centres silver is mined at depths below sea level, and the Lower Harz where agriculture prevails on land cleared of the forest, and copper is mined at Mansfeld, the chief German centre for this mineral. The whole region, which is associated with witchcraft and legendary occurrences, (see Walpurgis Night), is visited by tourists, the valley of the Bode being noted for its mountain scenery.

Harzburg. Town and spa of Lower Saxony, Germany, on the N. slopes of the Harz mts., 27 m. S. of Brunswick. Known for its saline baths and springs, its woods and pleasant sights, before the Second Great War it attracted 40,000-50,000 guests a year. The Burgberg, 1,580 ft. high, is linked with Harzburg by a suspension railway. The town takes its name from a castle, the ruins of which can still be seen. Built by the Emperor Henry IV between 1065 and 1069, destroyed by the Saxons, 1074, rebuilt by Frederick Barbarossa as imperial palace and fortress, it was pulled down 1650-54. In modern times, Harzburg was famous for its horse races. The compact between the Deutschnationale (Conservative) party and the Nazis, paving the way for Hitler, was made here, 1929. Pop. (est.) 7,000.

Hasa or **EL HASA.** Dependency of Saudi Arabia, on the Persian Gulf. A low-lying plain 350 m. long, it is bounded N. by Kuwait, whose sheikh is independent under British protection, and S. by the peninsula of Qatar. Before the First Great War the Turks claimed the sovereignty of Hasa, but in 1914 it was taken by Ibn Saud and came under the sovereignty of Saudi Arabia. The capital is Hofuf (est. pop. 100,000). Area 31,000 sq. m. Dates, rice, cotton, and indigo are grown; camels are bred; petroleum is worked at Dammam near Dhahran.

Hasan (625-689) and **Hussein** (629-680). Sons of Ali, adopted son of Mahomet and Fatima, the Prophet's daughter. After their father had been fatally stabbed in the mosque at Kufa, 661, the



Harwich, Essex. In the foreground is the Parkeston Quay extension from which travellers and merchandise leave for Hook of Holland and other Continental ports

brothers lived in retirement at Medina. Hasan is believed to have been poisoned by his wife. Hussein, who married a daughter of Yezdigerd, the last Sassanian king of Persia, was slain in battle at Kerbela, when on his way to respond to a popular call to the caliphate. The brothers are venerated by the Shiites as martyrs. *See* Ali; Mahomedanism; Shiites.

Hasdrubal OR **ASDRUBAL**. Carthaginian soldier. Left in Spain by his brother Hannibal (*q.v.*), when the latter set out on his expedition against Rome in 218 B.C., Hasdrubal carried on the war against the two Scipios, whose object it was to prevent him from reinforcing Hannibal. In 208 he crossed the Pyrenees, and in 207 the Alps, and reached Italy with his army. It was defeated, however, at the battle of the Metaurus, Hasdrubal himself was killed, and the disaster was made known to Hannibal by the throwing of his brother's head into his camp.

The name of Hasdrubal was borne by several other eminent Carthaginians, the most distinguished of these being the son-in-law of Hamilcar Barca (*q.v.*). As commander of the Carthaginian forces in Spain, he was responsible for the treaty fixing the boundary between the Carthaginian and Roman territory. *See* Carthage.

Hase, KARL AUGUST VON (1800-90). German Protestant theologian. Born at Steinbach, Saxony, Aug. 25, 1800, he was educated at Leipzig and Erlangen. He was tutor at Tübingen, 1823, and after being a political prisoner for ten months, during which period he wrote a novel, *Die Proselyten*, 1827, he went to Dresden. In 1828 he became professor of philosophy at Leipzig, and was during 1830-83 professor of theology at Jena, where he died Jan. 3, 1890.

He was the author of numerous works on theological questions, church history, ecclesiastical law, etc. His *Life of Jesus* first appeared in 1829, reached a 5th ed. in 1865, was rewritten in 1876, and translated into English in 1881. His *History of the Christian Church*, 1834, reached a 12th edition in 1900, and appeared in English in 1855. He also wrote a handbook of Dogmatics, 1826, a *Life of S. Francis*, 1856, a book on Protestant polemical theology, 1863, a *Life of S. Catherine of Siena*, 1864; lectures on Church History, 1880.

Haselden, WILLIAM KERRIDGE (1872-1953). British cartoonist. Born at Seville, Spain, he began his career as a clerk at Lloyd's,

London, but devoted his leisure to sketches and caricatures for publication. In 1904 he was appointed cartoonist to the *Daily Mirror*, and worked in that capacity until 1940. He was a pioneer in the art of the social cartoon, as in that of expressing pictorial humour in a minimum of lines. For many years he also illustrated the theatrical reviews in *Punch*. He is particularly remembered for his Big and Little Willie (the emperor William II, and the crown prince) during the First Great War. He died at Aldeburgh, Dec. 25, 1953.

Haselrig, SIR ARTHUR (d. 1661). English Parliamentarian. He was the eldest son of Sir Thomas Haselrig, Bart. (d. 1629), of Noseley, Leicestershire, and was one of the Five Members whose attempted arrest precipitated the Civil War. He became prominent among the

Puritans, was a firm upholder of the parliament, and opposed Cromwell's protectorship. In 1647 he was governor of Newcastle. Imprisoned in the Tower on the Restoration, he died there, Jan. 7, 1661. The name is variously given as Hesilrige and Haslerig.

Hashimite Kingdom OF THE JORDAN. Official name adopted 1946, of the former Transjordan. Shortened to Jordan (*q.v.*), it came into general use in 1949.

Hashish (Arab., herbage). Confection of *Cannabis indica*, or Indian hemp. Made from leaves of the plant, it is a narcotic, smoked, drunk, or eaten. It is classified as a dangerous drug. The word assassin is derived from hashish. *See* Cannabis; Hemp.



Haslar Hospital, Gosport. The main entrance

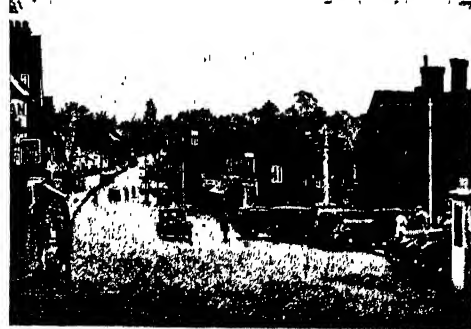
Haslar Hospital. Royal Naval hospital at Gosport, Hants. It was opened in 1754. The buildings and grounds cover 57 acres. Haslar was once the largest brick building in the world, and it still remains Great Britain's principal naval hospital, with accommodation for 1,116 patients. It is administered by a surgeon rear-admiral. The library and museum were destroyed by an air raid, Jan. 10, 1941.

Haslemere. Urban district of the county of Surrey, England, 13 m., S.W. of Guildford, 43 m. S.W. of London, with a rly. station (Southern region).

It stands in a valley between Blackdown Hill and Hindhead; around is some of the finest scenery in Surrey. There is an old church dedicated to S. Bartholomew, and an educational museum. Haslemere was a town at the time of the Domesday Book, and from 1582 to 1832 sent

two members to parliament. In 1887 Prof. Tyndall came here to live, and soon a number of literary and other professional people made it their home. Near is Aldworth House, where the poet Tennyson lived for many years, and where he died. Pop. (1951), 12,003.

Haslingden. Borough and market town of Lancashire, England. It is 19 m. N.W. of Manchester, with a rly. station. Haslingden is the centre of the cotton waste trade; silks and woollens, felt, shoes, and plastics are other manufactures. There are stone quarries and iron foundries. Water is obtained from Irwell valley water board, of which the council is a member. Pop. (1951) 14,513.



Haslemere, Surrey. The High Street, looking north

Hassall, JOHN (1868-1948). British poster designer and book illustrator. Born at Walmer, and



Hassall.

educated at Heidelberg, he became a farmer in Manitoba; then studied art at Antwerp, and at Julian's, Paris, 1891-94. He excelled in posters, book jackets, and children's books. He also produced many

humorous drawings in black-and-white. His bold outlines, simple humour, and unusual signature became well-known to the man in the street. He died March 8, 1948.

Hassan. District, subdivision, and town of India, in the state of Mysore. It is traversed by the W. Ghats and the Hemavati river. Coffee and cereals are raised for export. The minerals include feldspar, kaolin, and quartz. Scattered throughout the district is a large number of archaeological relics. Hassan, the capital of the district, is 64 m. N.W. of Mysore. Area of district, 2,666 sq. m. Pop. district, 627,718; town, 14,596.

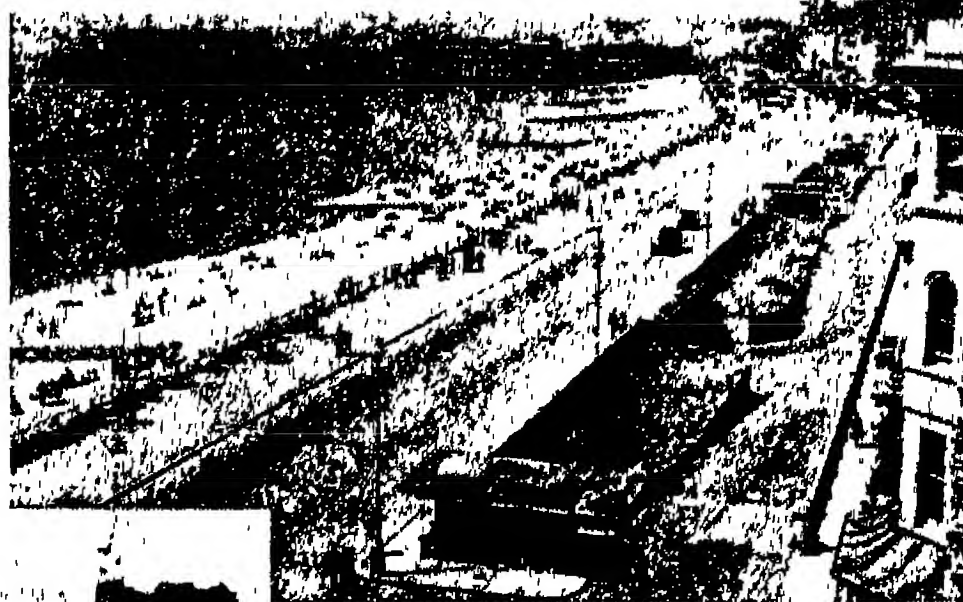
Hassan. Drama in five acts by J. E. Flecker. Though the author died in 1915, it was not published till 1922, and was first presented at His Majesty's Theatre, Sept. 20, 1923. It tells of the rise of a Baghdad confectioner to the court of Haroun Al Raschid, and how, sickened by the cruelty there and the wiles of a woman, he came to make the Golden Journey to Samarkand. The dialogue luxuriates in imagery and exquisite lyrics are interspersed. Henry Ainley gained a triumph as Hassan the confectioner. Incidental music was by Delius. In later years the play was broadcast several times.

Hassanein, SIR AHMED MOHAMED PASHA (1889-1946). Egyptian court official and geographer. Born Oct. 31, 1889, at Cairo, he was educated at the Royal School of Law, Cairo, and Balliol, Oxford. Attached to the staff of Gen. Sir John Maxwell, c.-in-c. Egypt, 1914-16, he later made several journeys of exploration in the N. African desert, discovering the oases of Arkenu and

Owenat, 1922-23, and gaining the founder's medal of the R.G.S., 1924, the gold medal of the French geographical society, 1928, and other similar honours. He became first chamberlain to King Fuad I, 1925, and was governor of the royal household from 1936. He was also a notable fencer, representing Egypt at the Olympic games, Antwerp, 1920. He was killed in a motor accident at Cairo, Feb. 19, 1946.

Hassan Ibn Sabbah (d. 1124). Persian sectary. Son of a prominent member of the Shiite sect in Khorasan, he had to leave Persia and later Egypt after unsuccessful political intrigues at the courts of Malik Shah and the caliph Mostansir respectively. His strong personality attracted a number of followers, to whom he taught his peculiar doctrines, and he thus founded the powerful Society of Assassins (*q.v.*). In 1090 he established their headquarters at Alamut, a strong mountain fortress of Persia, whence he came to be known as Sheikh-al-Jebal, or the Old Man of the Mountain. Among his victims were his own sons.

Hasse, JOHANN ADOLF (1699-1783). German composer. Born at Bergedorf, near Hamburg, March 25, 1699, he studied singing in Naples and sang for a time as a



Hastings, Sussex. Carlisle Parade and the pier and beach. Left: ruins of the castle which overlooks this historic coast town



much church music, and for many years lived at Dresden as director of the opera belonging to the elector Augustus of Saxony. After Handel, he is the leading representative of Italian opera before Mozart. He died Dec. 16, 1783.

Hasselt. A town of Belgium, capital of the prov. of Limbourg. It lies in flat country on the river Demer, 16 m. W.N.W. of Maastricht. It is an important rly. centre, and has small tobacco, distilling and brewing industries. A septennial kermesse on Assumption Day has several features of interest to students of folklore. At Hasselt the Belgians were defeated by Dutch troops on Aug. 6, 1831. Its railway yards were a target for Allied air attack during the German occupation in the Second Great War. It was liberated by American troops, Sept. 10, 1944. Pop. 26,828.

Hasselt is also the name of a small town in the Dutch province of Overijssel, lying 5½ m. W. of Zwolle. It was liberated by the 1st Canadian army in the first week of April, 1945.

Hastinapur. Ruined city of the Uttar Union, India, in Meerut district. It stands on the Burh Ganga, or former bed of the Ganges, 22 m. N.E. of Meerut, and was the capital of the great Pandava kingdom. It was demolished by a flood.

Hastings. County borough, market town, and seaside resort of Sussex, England. It is also the premier Cinque Port. The bor. includes St. Leonards. It is 62 m.

S.E. of London by railway. There is a fine promenade extending three m. from old Hastings to the W. end of St. Leonards. Several pleasure grounds include Alexandra Park, 100 acres in extent. The objects of interest include the remains of a castle built on West Hill soon after 1066, the churches of S. Clements (13th

century), All Saints (15th century), and some underground caves. Ecclesbourne Glen and Fairlight Glen are near. S. Mary's R.C. Church was built 1884 by Coventry Patmore in memory of his wife. The Brassey Institute contains an excellent library; a school of art is housed in the building. There is a town



Hastings arms



Battle of Hastings. Map of the surrounding country showing the routes followed by Harold and William. Inset, plan of the battlefield.

hall, museum and art gallery, grammar school, technical schools, hospitals, etc. Many amenities are provided for visitors, catering for whom is the town's chief industry. At the E. end between the East and West Hills lies the fishing quarter, and there is a fish market. Hastings was a town in Anglo-Saxon times, and in the early Middle Ages was a flourishing port. A bor. since 1589, it returned two M.P.s 1366 to 1885, one until 1950. It gives its name to a bor. constituency. Pop. (1951) 65,506.

Hastings. Town of North Island, New Zealand. It is 12 m. by rly. S.W. of Napier, in Hawke's Bay dist., and has refrigerating and canning works. Pop. (1951) 17,234.

Hastings, BATTLE OF. Fought Oct. 14, 1066, between the Normans under William, called after this victory the Conqueror, and the English under Harold II (*q.v.*). It took place on a hill, to which a later writer gave the name of Senlac, about 6 m. from Hastings.

Harold had just beaten the Norwegians at Stamford Bridge when he heard that William had landed at Pevensey. Rapidly marching southwards, he chose a position on which to meet the invader. His own bodyguard, the huscarls, men heavily armed with axe and shield, were the nucleus of his army, but he had also with him men of the fyrd, imperfectly armed and trained. All fought in a number of massed groups, and around each was a ring of stakes driven into the ground to impede horsemen.

The archers, the footmen, and finally the horsemen attacked the English, but could make no im-

pression on their closed ranks. Then some of Harold's auxiliaries left their places to follow a few who were routed, and William ordered some of his men to feign flight. The English ran down the hill after the Normans, who turned round and cut them to pieces. But on the hill the huscarls stood firm around their king. As night came on the archers began to shoot into the air. Then, with the arrows falling about their faces, the English gave

way, and the Normans got in among them. Fighting to the last, Harold and his two brothers were killed, and his army was totally destroyed.

Hastings, BARON. English title, now borne by the family of Astley. Sir John Hastings, a great man in the time of Edward I. was the first holder. In 1290 he claimed the crown of Scotland. Laurence, the 3rd baron, was made earl of Pembroke in 1339. John, the 3rd earl, was killed in a tournament in 1391, and the barony remained in abeyance until 1841. It was then given by the House of Lords to a descendant of the Hastings family, Sir Jacob Astley. He ranked as the 16th baron, and from him the present holder is descended. The family seat is Melton Constable, Norfolk.

This barony must be distinguished from another barony of Hastings, one held by the marquess of Hastings until 1868. It then fell into abeyance between the sisters of the last marquess, but in 1920 was claimed by the countess of Loudoun. See Loudoun, Earl of.

Hastings, MARQUESS OF. British title borne by the family of Rawdon-Hastings from 1817 to 1868. The first holder was the soldier, Francis, earl of Moira, who was made Viscount Loudoun, earl of Rawdon and marquess of Hastings in 1817. He married Flora Campbell, in her own right countess of Loudoun, and their son, Francis George (1808-44), inherited titles from both parents. The 3rd marquess was his son, Paulyn, and the 4th was another son, Henry. The latter gained a good deal of notoriety on the turf and in society,

dying without children, Nov. 10, 1868. The titles that had come down from his grandfather, including the marquessate of Hastings, then became extinct, but those of his grandmother passed to his sisters. In addition the marquess had inherited the baronies of Botreaux, Hastings, Hungerford, and Grey de Ruthyn. The estates passed to his elder sister, the countess of Loudoun. The seats were Donington Hall, Leicestershire, and Loudoun Castle, Ayrshire. See Loudoun, Earl of.

Hastings, FRANCIS RAWDON-HASTINGS, 1ST MARQUESS OF (1734-1826). British soldier and admin-



After M. A. Sheen, R.A.

istrator. Born Dec. 9, 1754, he was the son of Sir John Rawdon, an Irish baronet, afterwards made earl of Moira. Educated at Harrow and University College, Oxford, he entered the army in 1771.

He served in the American War of Independence, commanding a volunteer force of Irishmen, and in 1783 was made a baron. In 1793 he became earl of Moira. In 1813 Moira was appointed governor of Bengal and c.-in-c. India. He founded Singapore city, 1819. He was made marquess of Hastings in 1817. Hastings resigned in 1821, but did not leave India until 1823. His policy was disliked by the E. India Co. From 1824-26 he was governor of Malta, and he died Nov. 28, 1826. See Life, Ross of Bladenburg, 1803; Private Journal, ed. Marchioness of Bute, 1858.

Hastings, SIR PATRICK (1880-1952). British lawyer and playwright. Born March 18, 1880, and educated at Charterhouse, after serving in the S. African War he started to read for the bar. Called by the Middle Temple, 1904, he became one of the most brilliant advocates of his day. Made K.C. 1919, and knighted 1924, he sat as Labour M.P. for Wallend, 1922-26, and was attorney-general, 1924.

His first play was *The River*, 1925; *Scotch Mist*, 1926, ran for 117 performances; then came *The Moving Finger*, 1928; *Escort*, 1942; *The Blind Goddess*, 1947 (133 performances). He published an autobiography, 1948, and reminiscences, *Cases in Court*, 1949. He died in London Feb. 26, 1952.

Hastings, WARREN (1732-1818). British administrator. Born at Churchill, Oxfordshire, Dec. 6,



Warren Hastings
After T. Kettle

1732, he was the son of Penniston Hastings, the rector of the parish. His mother died a few days after his birth, his father went abroad, and the child was looked after by his grandfather, another Penniston Hastings. He was educated at Churchill, at a school at Newington Butts, and finally at Westminster, where he was a king's scholar. In 1750 he became a writer in the service of the E. India Co.

In 1756 Hastings joined the force that under Clive recovered Calcutta from Suraj ud-Dowlah. He served Clive well in some diplomatic work, and after Plassey was made president at Murshidabad, where he worked in close harmony with his chief, and did good service to the E. India Company. In 1761 he became a member of the council of Bengal, and, returning to Calcutta, he passed three years mainly in disputes with his colleagues. He resigned in 1764.

Governor-General of India

After four years in England, Hastings returned to India in 1768, as second member of the council of Madras, remaining there until transferred to a like position in Bengal. In 1772 he became president of the council of Bengal, and in 1773 he was named governor-general of India under Lord North's regulating Act. The government was controlled by a council of five, and three of these members, led by Sir Philip Francis, habitually thwarted the governor-general. Despite this antagonism, Hastings reorganized the administration of Bengal, laying the foundations of the Indian civil service. The blunders of the British authorities in Bombay and Madras forced him into wars with the Mahratta powers, and with Haider Ali; the boldness with which he faced these emergencies saved the British power in India from destruction. After the departure of Francis, the council acted somewhat more harmoniously, and Hastings had a less difficult time in the years that preceded his recall in 1785.

In the straits to which he was reduced, by want of funds and lack of effective support from the Com-

pany, Hastings adopted methods which would have been a matter of course for Orientals, but which Europeans cannot employ without risk of censure. Public opinion in England was stirred against him by his chief enemy, Francis, whom he had wounded in a duel in Aug., 1780. Soon after his return he was impeached. The trial, which began in 1788, aroused tremendous interest. It lasted over seven years, the chief charge against Hastings being that he had hired out British troops to exterminate the Rohillas, had robbed the begums of Oudh, and was responsible for the judicial murder of Nuncomar. The house of lords unanimously acquitted him on every charge, and the verdict of successive governors-general was emphatically in his favour. He was ruined financially by the trial, but the Company made tardy reparation by conferring a pension on him, and before his death the house of commons acknowledged formally his distinguished services to Britain. He died at Daylesford, Aug. 22, 1818, and was buried in the church there. See India.

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Hastings Beds. Series of sandstones, sands, clays, and layers of limestone, forming the lower part of the Wealden series in Kent, Surrey, and Sussex. Their greatest thickness is 1,000 ft., and they contain fossil remains. See Cretaceous.

Hat. Covering for the protection or adornment of the head. Its origins are unknown, but hats made from straw or grass or from the skins of animals have been worn by primitive peoples. Hats made from grasses and rushes were worn in Egypt in very early times, and the people of ancient Greece and Rome wore something near the modern hat, a low crowned, wide brimmed felt hat tied under the chin, the brim distinguishing a hat from a cap (*q.v.*; see also plate f. p. 1705). Hats seem to have been introduced into England some time during the 12th century. Worn at first as a protection from the elements, hats gradually became an item of personal adornment.

During the 14th and 15th centuries, trades and professions adopted special types of hat. For

instance, in the 14th century, most professional men wore tall felt hats with upturned brims. This type of hat was worn well into the 15th century, when the flat hat, usually of velvet, and popular in Tudor times, was introduced; the best known example is that in Holbein's portrait of Henry VIII. Then came hats trimmed with plumes and other adornment; later the high crowned, wide brimmed Puritan hat introduced in the early 17th century; and in the time of Charles II the big low crowned hat with a profusion of feathers worn by the Cavaliers.

The clergyman's hat has a long ancestry, and the hats worn by bishops and deans are survivors of a bygone fashion. The red hat of the cardinal was introduced about 1250 by Innocent IV, its colour symbolising the cardinals' willingness to shed their blood for the Church.

HAT MAKING. Most hats in civilized countries are of felted fur or of straw, carefully shaped to suit prevailing fashion by means of wooden or metal blocks.

Composition of Felt Hats

Felt hats are made from a mixture of rabbit fur or wool, the better qualities being made from fur, which is cut into small particles and dropped into a forming machine, the interior of which is a spinning cone. This is fitted with strong suction pipes, upon which acidulated water is sprayed, these two processes causing the hairs to felt together and form a V-shaped hood, which is removed from the cone, and gradually shrunk with boiling water and rotating rollers until the felted fur becomes workable. Shellac is then added in varying degree according to the type of hat being made. Dyeing follows, after which the felt hood is pulled into the desired shape after it has been softened with steam. The shaped hood is dried on the block in an oven, and the hat is then ready for trimming.

The felt hat industry in Great Britain came to be centred principally in the N. of England, at Stockport, Denton in Lancs, and Atherstone, Warwickshire. Later, Luton, Beds, added felt to its straw hat industry.

Hats made of straw were introduced in England quite early, but their modern popularity dates only from about 1850. Straw is an obvious choice for hat-making: not only is it a common substance, but it is extremely light, a hat of closely plaited straw weighing 2½-3 oz. Straw is normally brittle,



Hat. Stages in hat manufacture at Luton, Beds, where the industry has been carried on for nearly two centuries. 1. Forming a felt hood on the cone of a carding machine. 2. Tip stretching to shape felt hat crowns after they have been softened by steam. 3. Finishing wool hoods. 4. Steam pressing at a blocking machine

but when slightly moistened it can be shaped easily; it can be readily bleached or dyed, and is pleasing in its natural colour. Straw hat making in Great Britain was localised in the S. Midlands, Luton and Dunstable, Beds, being centres of the industry. At first the plait used came from the villages near Luton; but later straw plait and straw hoods (for shaping) were imported from many parts of the world, including China, the Philippines, Italy, and France, while synthetic copies and new designs were made in Swiss villages.

Blocks similar to those used in the manufacture of felt hats are used in straw hat making. The straw is machine sewn to form a hood which is stiffened with a mixture of gelatine and water, and blocked to the shape desired. Sometimes hydraulic presses are used for this purpose. Paris, the great fashion centre, remains the source of inspiration of shape and style.

E. W. Barratt

Hatay, THE. Vilayet of Turkey. At the N. end of the Levant coast, and bounded on the E. and S. by Syria. The chief towns are Antioch and Alexandretta (*q.v.*). Area 1,939 sq. m. Pop. (1955) 364,992.

Hatch. Opening on the upper deck of a ship giving entry to the hold. When not in use, the hatch is covered with planks secured to the coaming by battens. The term hatch is also used for a stop-plank or flood-gate falling in ver-

tical grooves in a frame and supporting a head of water in a weir. Another kind of hatch is the small service door between kitchen and dining-room through which food and dishes are passed.

Hatchment. Lozenge-shaped panel used to display the armorial bearings of a deceased person. If



Hatchment in heraldry

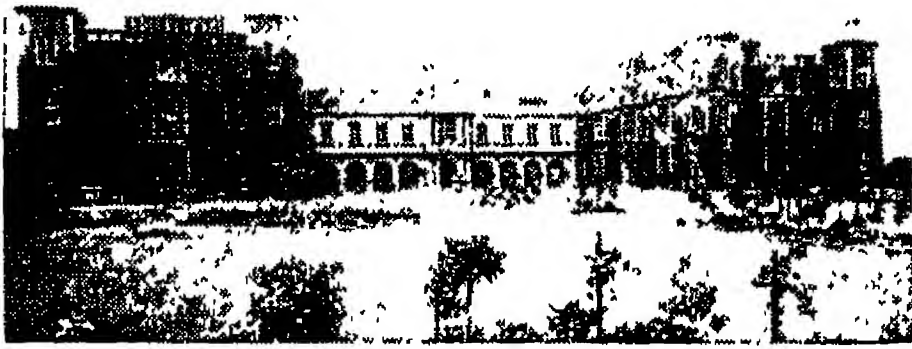
erected to commemorate an unmarried person, a widower, or a widow, the whole of the panel surrounding the armorial shield would be painted black; if for a husband or a wife, the arms would be impaled, and half the hatchment would be painted black and half white, the black being on the dexter or sinister according to whether the deceased was the husband or the wife. Hatchments were formerly affixed to the residences of deceased persons and also carried in the funeral procession, to be subsequently hung up in the church. Many country churches in England still retain hatchments of local families. The word is said to be a corruption of achievement (*q.v.*). See Heraldry.

Hatfield or Bishop's Hatfield. Parish and market town of Hertfordshire, England. It stands on the Lea, 17½ m. N. of London, on

the railway and the Great North road, is secluded, especially since the construction of the Barnet by-pass road, and remarkable for its picturesque old houses and fine church. There is an aerodrome, with an aircraft factory and technical school. Known as Heathfield in Saxon times and as Hetfelle in Domesday, the manor was given by Edgar to the monks of Ely, and here, 1108-1538, the bishops of Ely had a palace, parts of which, including the banqueting hall and a gatehouse, remain. The manor was conveyed in 1538 by Bishop Goodrich to Henry VIII in exchange for lands in Cambridge, Essex, and Norfolk. Edward VI, who lived here occasionally before coming to the throne, conveyed it to his sister Elizabeth, who here held her first council. It was given in 1803 by James I to Robert Cecil, 1st earl of Salisbury, in exchange for Theobalds (*q.v.*), near Cheshunt, and it has remained since in possession of the Cecil family.

The church of S. Etheldreda dates from Norman times, and has two noteworthy chapels, one containing a recumbent effigy of Robert Cecil (d. 1612), and the other monuments of the Brocketts and Reades, of Brocket Hall, 3 m. from Hatfield, where at different times Melbourne, Palmerston, and Mount Stephen resided. Pop. 11,204. (See Welwyn.)

Other Hatfields include one in Worcestershire, 4½ m. south of



Hatfield House. South front of the Hertfordshire mansion built by the 1st Earl of Salisbury, 1611

Worcester. Hatfield Broad Oak, Hatfield Regis, or King's Hatfield, in Essex, $5\frac{1}{2}$ m. S.E. of Bishop's Stortford, is the site of a 12th century Benedictine priory. Hatfield Forest is a parish $2\frac{1}{2}$ m. N.W. of Hatfield Broad Oak; Great Hatfield is in the East Riding of Yorkshire; Hatfield Heath, a parish and village of Hatfield Broad Oak; Little Hatfield, in the East Riding of Yorkshire; and Hatfield Peverel, an Essex village $2\frac{1}{2}$ m. S.W. of Witham, has remains of a 12th century Benedictine priory.

Hatfield Chase. Dist. of Yorkshire (W.R.). Composed of peat moss, it lies between the rivers Don, Idle, and Thorne. Originally, as the name suggests, deer were common in parts of it, while elsewhere there were fish. In 1626 it was drained by Cornelius Vermuyden, and most of its 180,000 acres is now under cultivation. The village of Hatfield, 7 m. from Doncaster on the Don, has an interesting church, S. Lawrence. The manor house here was once a royal residence, used when the kings hunted in the chase. Hatfield is supposed to be the Heathfield at which Penda, king of Mercia, gained a victory over the Northumbrians in 633. The railway station is Stainforth.

Hatfield House. Seat of the Cecils, in Hertfordshire, England. Built of red brick and Caen stone, and one of the most notable examples of Jacobean architecture in the kingdom, it stands in the parish of Hatfield or Bishop's Hatfield. Erected by Robert Cecil, 1st earl of Salisbury, it was completed in 1611. Part of the old palace of the bishops of Ely is near by. The house stands in a park measuring upwards of 10 m. in circumference. In the park is preserved the oak tree, under which, according to tradition, Elizabeth I was seated when she received news of her accession to the throne.

In shape a parallelogram, with two wings on the S. front, from designs by John Thorpe, the building was restored by the 6th earl. The west wing was almost tot-

ally destroyed in a disastrous fire, Nov. 27, 1835, when the widow of the 1st marquess lost her life at the age of 85, but it was soon rebuilt. Notable features are the hall, grand staircase, long gallery, King James's room, armoury, library, summer and winter dining-rooms, drawing-room, and chapel.

In Hatfield House is preserved a remarkable collection of MSS. and state papers, some of which have been published by the Historical MSS. commission, many relics of Tudor and Jacobean times, and a large number of historical portraits, including that of Queen Elizabeth I by Zuccaro. Much interest attaches to a genealogical tree, 42 ft. long, drawn up for Elizabeth, tracing her descent back to Adam. In the grounds an early tank of the First Great War, with a suitable inscription, commemorates the secret trials held there in 1915 of the prototype Mark I tank. Outside the gates is a bronze statue, by George Frampton, of the 3rd marquess of Salisbury, erected by Hertfordshire friends and neighbours, Oct. 21, 1906. See Cecil.

Hathaway, ANNE (1556-1623). Maiden name of the wife of William Shakespeare. She was daughter of Richard Hathaway, yeoman farmer of Shottery, near Stratford-on-Avon, and married Shakespeare Nov. 28, 1582, being eight years older than her husband. Of the



Anne Hathaway's Cottage at Shottery, Stratford-on-Avon, Warwickshire. It is open to the public and receives many visitors in the summer months

three children of the marriage, the son died aged 12; the daughters outlived their parents.

Hathor. Ancient Egyptian mother goddess. A sky-deity, cow-headed or cow-horned, she was associated with the rising and the

setting of the sun, and was specially worshipped by women; ladies of the court served as her priestesses. In human form, with horned disk, she was sometimes identified with Greek Aphrodite (*q.v.*). The sycamore was sacred to her, since she was one of the deities of the dead. The seven Hathors were benignant fates. See Dendera; Egypt; Isis.

Hathras. A subdivision and town of the Uttar Union, India, in Aligarh district. The district is extensively cultivated. Hathras town is a rly. junction and an industrial and commercial centre; also a centre for the making of brass utensils and cutlery. Area, 290 sq. m. Pop., subdivision, 250,000; town, 47,000.

Hatschek, EMIL (1869-1944). British scientist. Hungarian by birth, Hatschek spent his childhood and youth in Vienna, where he studied at the Polytechnicum. Coming to England in 1888, he was naturalised in 1900. An excellent linguist and a man of encyclopedic knowledge, his reputation as a brilliant and original experimenter and an authority on colloid science dated from the start of his investigations into the properties of colloids. His work in this sphere touched on chemistry and biology as well as physics. He carried on a regular course in colloid chemistry at the Sir John Cass Institute, 1911-35. Author of *The Physics and Chemistry of Colloids*, *The Viscosity of Liquids*, and other technical works, he died in London, June 4, 1944.

Hatshepsut. Egyptian queen of the XVIIIth dynasty, about 1500 B.C. During the peaceful years of her co-regency with her young nephew Thothmes III, she assumed the regalia of kingship. The trading expedition which she sent to Punt (*q.v.*) was commemorated in her beautiful terraced temple at Deir el-Bahari (*q.v.*).

Hatteraick, DIRK. Dutch smuggler in Scott's novel, *Guy Mannering*, who fears neither "dog nor devil." He strangles Gilbert Glosin, afterwards hanging himself.

Hatteras. Cape of N. Carolina, U.S.A. It is known as the graveyard of the Atlantic, its sandy beach being strewn with the

remains of ships wrecked on shoals. The easternmost point of the state, it is separated from the mainland by Pamlico Sound. The Gulf Stream flows past 20 m. out. A 166-ft. lighthouse on the cape has a revolving beacon visible for 19 m. and the Diamond Shoals lightship, anchored 13 m. off the tip, has a beacon visible for 14 m. A recreational area belonging to the federal government includes a waterfowl refuge. Hatteras Inlet, abounding in tarpon, marlin, swordfish, and dolphin, is famous for deep sea fishing. Many of the 500 inhabitants of the community of Hatteras speak with a Devon accent, ascribing it to their supposed descent from shipwrecked English sailors.

Hattiesburg. City of Mississippi, U.S.A. Co. seat of Forrest co., situated at the confluence of the Bowie and Leaf Rivers, 115 m. N.N.E. of New Orleans, it is served by rlys. and an airport. In the midst of an agricultural region, it manufactures metal and chemical products, piping, boilers, castings, roofing, ventilators, tiles, harness, fertilisers, and mattresses. Founded in 1881, it became a city in 1895. Pop. (1950) 29,474.

Hattin. Village of Palestine, the Ziddim of the O.T. It lay 5 m. N.W. of Tiberias, and was the scene of the final overthrow of the Crusaders by Saladin in 1187.

Hatto. Name of two archbishops of Mainz. Hatto I became abbot of Reichenau and in 891 archbishop of Mainz. As head of this diocese he took a leading part in German politics. He was a trusted counsellor of King Arnulf, being afterwards ruler of Germany for his son, Louis the Child. He helped Conrad I to secure the throne after the death of Louis, and for some reason brought upon himself the dislike of the Saxons and their duke, Henry the Fowler. He died May 15, 913.

Hatto II, archbishop 968-970, is the person associated with the legend of the Mouse Tower at Bingen, the story being that he was devoured by rats or mice. At one time Hatto I was regarded as the victim, but later research makes the tale refer to Hatto II, who had a reputation for oppressing the poor. *Consult* Curious Myths of the Middle Ages, S. Baring-Gould, 1897.

Hatton, Sir Christopher (1540-91). English courtier. Born at Holdenby, Northants, he was educated at S. Mary Hall, Oxford, and admitted to the Inner Temple in 1559. His prowess in a tourney

attracted the notice of Queen Elizabeth, who made him a courtier. She showered favours upon him, and he entered parliament.



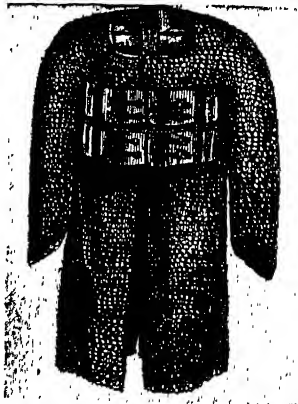
Sir Christopher Hatton, English courtier

Elizabeth employed him in the trials of Babington and Mary Queen of Scots, and eventually caused him to be made lord chancellor in 1587. He acquitted himself with moderate success, and retained the office until his death, Nov. 20, 1591.

Hatton Garden. A London thoroughfare named after Sir Christopher Hatton (*v.s.*). It connects Holborn Circus with Clerkenwell Road, and is the centre of the diamond trade in London.

Hattusas. *See under* Boghazkoi.
Hattusil or **HATTUSHLISH.** Name of several Hittite kings, the greatest and last of whom, Hattusil III, reigned c. 1280-1250 B.C. He extended the frontiers of the Hittite empire but concluded a treaty with the pharaoh Rameses II whereby the long war between Hittites and Egyptians for possessions of North Syria ended in a compromise c. 1270 B.C.

Hauberk. A coat of chain mail or closely linked iron or steel



Hauberk. Coat of chain mail as worn by John of Gaunt

rings. At first probably little more than a gorget (*q.v.*), it developed until it sometimes reached to the wearer's knees—and had sleeves reaching nearly to the wrists. The Norman hauberk was put on over the head like a modern sweater; other forms were fastened up the front. The hauberk fell out of use in the 15th century. *See* Armour.

Hauch, HANS CARSTEN (1790-1872). A Danish poet. Born at Fredrikshald, Norway, May 12, 1790, in 1846 he was appointed professor of northern literature at Kiel. He left the country during the Holstein revolution in 1848, and in 1851 became professor of aesthetics at Copenhagen, holding the post until his death. He died in Rome, March 4, 1872. Hauch wrote several historical tragedies, many lyrics and romances. An edition of his works was published at Copenhagen, 1873-75.

Hauff, WILHELM (1802-27). A German poet and novelist. He was born at Stuttgart, Nov. 9, 1802, and having studied at Tübingen, acted as tutor for a couple of years.



Wilhelm Hauff, German poet

He became editor of *Das Morgenblatt* in his native town in Jan., 1827, but died Nov. 18 the same year. In his short life he wrote much of lasting excellence, notably his three series of Märchen (Fairytale), 1826-28; *Lichtenstein*, a Würtemberg romance in the manner of Scott, 1826; *Memoiren des Satan* (Memoirs of Satan), 1826-27, rich in humour; and *Novellen* (short stories), 1828.

Haugesund. Seaport of Norway, in the amt of Rogaland. It stands on the W. coast, near the N. extremity of the island of Karmø, 60 m. due S. of Bergen. The port carries on a thriving trade, mainly in timber and fish. It was to Haugesund that a German prize crew brought the U.S. steamer *City of Flint* (*q.v.*) in 1930. Pop. 18,119.

Hauksbee, FRANCIS (d.c. 1713). English scientist. An early experimenter in electricity, he discovered that an "electric light" could be produced by rubbing amber, glass, and wool, and invented the first machine, consisting of a glass cylinder rubbed by the hand, for the production of electricity. He also introduced improvements in air-pumps, giving his name to the Hauksbee pump. He was made F.R.S. in 1705; his *Physico-Mechanical Experiments touching Light and Electricity*, afterwards translated into French and Italian, appeared in 1709.

Haulage. Term used for the transport of material. In its broader sense of haulage over road or railways, it is discussed

under Transport; Railways. In mining (*q.v.*) haulage is most important; upon its efficiency the success of an enterprise may depend. The primitive method of removing material from a mine to the place where it is to be deposited for treatment consisted in loading it on to the backs or shoulders of men or women, in some kind of container, and having it carried out. Later mechanical methods of increasing complexity developed into the elaborate haulage plants of the gold and diamond mines of the Transvaal, for example, which include the light railway, the standard railway, and the aerial railway or wire rope.

Haulage in a coal mine is main and secondary or contributory, the latter consisting in transporting the coal from the working face to the main haulage ways; the former in conveying it to the foot of the shaft. In the main haulage, trains of trucks or tubs are drawn along rails either by horses, locomotives powered by compressed air, electricity, Diesel engine, etc., or by wire ropes operated from near the bottom of the shaft either electrically or by means of engines worked by compressed air. The tubs or trucks are of iron or steel or wood, and hold from 10 cwt. to 10 tons of coal, their size being determined by the character of the workings. In the direct haulage system, where the tubs are brought up an incline direct from the working face to the shaft, they are usually arranged to run back empty by their own weight on a single line of rails. Where the gradients are suitable, belt conveyors placed in series are often used.

Haulbowline. Island in Cork Harbour, co. Cork, Eire, S. of Cobh (*q.v.*). On Haulbowline Rock, at the mouth of Carlingford Lough, is a lighthouse, erected 1823.

Haunted House. The idea that houses and other places are haunted by the ghosts of the departed is very ancient, and common to nearly all nations. The usual ghost story describes various noises, together with the appearance of ghostly visitants, usually connected with some crime or tragedy that has been committed in the place. The majority of such tales are founded on careless and inaccurate observation, and the sounds and phenomena are explicable by material causation.

There are on record, however, well authenticated cases which cannot be put down to the imagination, the evidence for them being

as convincing as it well could be. Of several explanations proposed, the most probable appears to be that persons under strong emotion—as when meeting a violent death—may leave some kind of impression on their surroundings, one normally as imperceptible as the image on an undeveloped photographic plate which becomes apparent only when the plate is placed in the developer. So the alleged impression becomes apparent only to those who are psychic or peculiarly sensitive thereto. This would account for the fact that some persons—otherwise perfectly normal—are greatly given to experiencing these strange phenomena, while others never do so.

Byron's Testimony

Among houses at which supernatural appearances are said to have been observed is Mannington Hall, Norfolk, where Dr. Jessop, rector of Scarning, on Oct. 10, 1879, saw the figure of a man in an old-fashioned costume of clerical cut. Newstead Abbey is reputedly haunted by a Black Friar, presumably one of the Augustinian order expelled in 1539 when the property was sold to Sir John Byron. The poet Byron declared he had seen him, and that the appearance of the Friar foretold a death in the family. Incidentally, Newstead Abbey is considered unlucky to its possessors, a view founded on the belief, as expressed in Spelman's History of Sacrilege, that holders of what was once Church property are doomed to disaster.

Numerous instances have been recorded of movements of furniture and other disturbances which people living in a house have been unable to explain. The occurrences at Epworth parsonage, home of the Rev. Samuel Wesley, in 1716-17 were of this character. It was formerly supposed that such happenings were caused by malicious spirits, or poltergeists. Careful analysis has shown that they generally centre round a person, often a child at the age of puberty, who is physically or mentally abnormal. Whether the disturbances, for the most part senseless pranks, are due to subconscious trickery on that person's part, or to more unknown physical force remains matter for debate.

A circumstantial account of haunting is given in the book The Alleged Haunting of B—— House (2nd ed. 1900), Balloch House, Perthshire, being the mansion in question; while in its journal of Oct.-Nov., 1914, the society for psychical research published an

account of unexplained happenings—bangs, voices calling, groans, visible and invisible presences—occurring during 1901-13 to the inhabitants and to visitors in a 100-year-old house in a Midland village which had no known previous history of haunting.

Ghosts have a kind of quasi-legal status in the sense that the owner of a house stated to be haunted may bring an action at law for "slander of title," and may recover damages, as in the case of the modern house called Hillside at Egham, occupied by Stephen Phillips in 1903. He left the alleged haunted house and forfeited the rent. In 1904 the owner brought an action against his late tenant and a morning newspaper, but the case was settled out of court for £200. In 1906 the Daily Mail was defendant in a similar action, when £90 damages was awarded; but judgement was reversed on appeal. The house was afterwards peacefully occupied.

Hauptmann, BRUNO RICHARD. An American criminal, of German birth. A carpenter by trade, Hauptmann achieved world-wide notoriety when he was tried in 1935 for the kidnapping and murder of the baby son of Col. Charles Lindbergh in March, 1932. Found guilty and sentenced to death, Feb. 1935, he was executed April 3, 1936. See Lindbergh Baby Case.

Hauptmann, GERHART (1862-1946). German dramatist. Born at Salzbrunn, Silesia, Nov. 15.



Gerhart Hauptmann,
German dramatist

1862, at the age of eighteen he became an art student at Breslau, and in 1883 went to Rome, where he hired a studio and dabbled in sculpture. His marriage in 1885 made him independent of earning a livelihood, and, having returned to Germany, he resumed his studies. In 1889 he began writing plays with Vor Sonnenaufgang, followed in 1890 by Das Friedensfest; Einsame Menschen, 1891. Die Weber, 1892, dealing with Silesian weavers, was his most popular success.

The first of these, by its outspoken attack on existing conditions and ways of thought, placed Hauptmann at the head of modern German dramatists. With an almost repellant naturalism and realistic depiction of the mean-nesses and ugly trivialities of

current life, he struck a new chord in contemporary literature and art. From 1892 his outlook broadened, and thenceforward his output was considerable and varied. His novels *Emanuel Quint*, 1910, and *Atlantis*, 1912, were powerful works. Recipient of the Nobel prize for literature in 1912, his works have been widely translated. His *Insel der grossen Mutter* appeared 1924. He kept aloof from the Nazi regime, his later works remaining unpub. until after his death, June



Hausa woman with feet and arm bandaged after the ceremonial application of henna. Above, Hausa man

was characteristic of their culture; the chief example was Kano, which remains an important trading centre. Their language is the language of trade over much of northern Nigeria. There are vigorous Hausa colonies in Tunisia and Libya, North Africa.

Hausa. Language spoken in Africa by 15,000,000 people, many of whom profess Mahomedanism; their original home appears to have been between Sokoto and Bornu. With a written form, in modified Arabic characters, it has been adopted as the trade language from Lake Chad to the Guinea coast. It is generally considered to belong to the Hamitic family of languages, which include Egyptian (Coptic), Galla, and Berber. According to some, it is a Semitic tongue, but although the vocabulary contains a considerable Arabic element, it has no guttural sounds like Arabic 'Ain and Ghain, and triliteral roots, the characteristic feature of all Semitic languages, are wanting.

The literature consists mainly of religious hymns and war-like songs translated from the Arabic. Since the territory came under British protection Hausa has received considerable attention, and a readership in the language has been established at Cambridge. *Consult Dictionary of the Hausa Language*, Robinson, 4th ed. 1925.

Hauser, KASPAR (d. 1833). Wild boy of Nuremberg. He was found in the market place of that city, May 26, 1828, dressed as a peasant, incoherent of speech and holding in his hand a letter professedly written by a poor labourer who said that the boy had been deposited at his door, 16 years before, by an unknown person. The boy declared that he had been brought up in strict confinement in a small cage, on a diet of bread and water, and that he had never seen the sun. At first he was imprisoned, but subsequently his education



Kaspar Hauser, wild boy of Nuremberg
From a contemp. print

was undertaken by the city and by Earl Stanhope, and eventually he became a clerk. He died at Ansbach, where he had been sent to be educated, Dec. 17, 1833, from a wound in the left breast, which, he said, had been inflicted by his early custodian. Whether he was impostor or victim has never been determined.

Haushofer, KARL (1869-1946). A German geographer and army officer. Born Aug. 27, 1869, at Munich, he was a professional officer in the Bavarian army, 1887-1918. As a captain on the German general staff, he was sent on a mission to Japan, where he remained until 1910. During the First Great War, rising to maj-gen., he held a number of commands in the field. In 1921 he was appointed prof. at Munich of geography and of the "science" of geopolitics (*g.v.*), which he had invented and on which subject he founded a monthly in 1924. Through one of his students, Hess, he early came into close personal touch with Hitler, over whose policy he was believed to have had great influence. He published *Japan und die Japaner*, 1923; *Geopolitik des Pazifischen Ozeans*, 1925, and other works. He committed suicide with his wife, on March 13, 1946.

Haussmann, GEORGES EUGENE, BARON (1809-91). French administrator. Born in Paris, March 27, 1809, of German extraction, and educated in Paris, he entered the civil service, in which he made good progress. In 1849 he was made prefect



of Var, and in 1853 prefect of the Seine; in that capacity he became famous as the rebuilder of Paris. Much of the city was remodelled by him, his improvements including the planning of the Bois de Boulogne and of extensive boulevards. He also built bridges and provided Paris with a new system of water supply and sewerage. In 1870, owing partly to the expenditure he had incurred, he was dismissed. In 1877 he entered the chamber of deputies as Bonapartist deputy for Ajaccio, and he died in Paris, Jan. 11, 1891. The Boulevard Haussmann (see illus. in p. 1334) preserves his name. *Consult* Life, J. M. and B. Chapman, 1957.

8, 1946. at Agnetendorf, Silesia.
Hauraki, GULF OF. Arm of the Pacific Ocean, on the E. coast of North Island, New Zealand. Protected by the Great Barrier Island athwart its entrance, it affords safe anchorage for the numerous vessels plying to the ports of Auckland and Thames. Its southern extension is called the Firth of Thames. The Gulf of Hauraki contains many islands; it is 70 m. long and 42 broad.

Hauran, THE (Heb. *chauran*, the hollow land, from its many caves). District of Syria, the ancient Auranitis. It lies E. of the Jordan, with loosely defined boundaries, but it forms the elevated plain, much of which is fertile, lying between the Upper Jordan to the W. and the Jebel Hauran, or Jebel Druse (alt. 6,000 ft.), to the E.; the Jebel Hauran separates it from the district of Jebel Druse. Its 60,000 inhabitants include colonies of Druses.

The West Hauran river is an Iraqi seasonal tributary of the Euphrates.

Hausa. Negroid people, the majority of whom live north of the Benue and Niger rivers in Nigeria. Their culture, based on peaceful settled husbandry, handicrafts, and trade, advanced under Libyan impetus, and the adoption of Islam by the upper classes. Their political power was overthrown by the Fula chief Dan Fodio in 1810, but after the British occupation of Sokoto in 1903 their virile temperament again emerged. Walled cities

Hautboy. See Oboe.

Haute École (Fr., high school). Term for the application of equestrian art and science at the highest level. The horse is trained not only to execute the ordinary movements and gaits—walk, trot, canter, halt, rein back—with brilliance and precision, lightness and balance, but to perform the special series of difficult movements called the “airs.” These are divided into movements on the ground and “in the air.” Movements on the ground include changes of leading leg at the canter (simple and flying), all turns on the forehand and haunches, lateral work, shoulder—in and out, haunches—in and out, normal movements of basic training; also “passage,” a brilliant, highly-collected elevated trot, marked by a graceful cadence and characteristic pointing of the toes and a brief hesitation before each foot comes to the ground; “piaffe,” the “passage” in place without any forward movement, a kind of “marking time”; “pirouette,” a small circle on two tracks, the forehand moving round the haunches, the inside hindleg, the pivot of the movement, rising and falling on the same spot with a marked regular cadence; “levade” (“pesade”), a half-rear made from a squatting position on the haunches, forelegs folded under; “mezair,” a series of “levades” with a step on the ground after each. Movements off the ground (“in the air”) include: “courbette,” a full rear, forelegs folded as in the “levade,” a few seconds pause, then a jump forward without bringing the forelegs to the ground; “croupade,” a forward leap with both fore- and hindlegs tucked in under the body; “ballotade,” similar to the “croupade” with less gathering of the legs under the body, hind hoofs turned outwards; “capriole,” a development from the “ballotade,” the horse plunging forward with its legs stretched as horizontally as possible and giving a vigorous kick with both hindlegs before reaching the ground.

These are the official high school “airs” handed down through all the schools of classical riding in Europe from the days of de la Guérinière (c. 1690–1750). They can still be seen performed at the Spanish Court Riding School of Vienna. The Spanish walk (trot), gallop backwards, rocking the haunches in the “passage” and similar movements, kneeling down,

lying down, bowing are circus tricks and are not included in the repertoire of classical haute école. Consult *École de Cavalerie*, F. de la Guérinière, 1729; *The Spanish Riding School*, Col. A. Podhajsky, 1948; *Riding Technique in Pictures*, C. E. G. Hope and C. Harris, 1956.

Haute-Garonne. Department of S.W. France, on the borders of Spain. In the S., where it touches the Pyrenees, the dept. is mountainous, having peaks over 10,000 ft. high; in the N. it is hilly. The chief river is the Garonne, which flows right through it; others are the Salat, Ariège, and Save. The Canal du Midi also runs through the dept. Much of the land is forested, but in the lower districts the soil is fertile, and wheat, maize, the vine and other fruits are grown. Mineral springs abound, the chief being at Bagnères-de-Luchon. Toulouse is the capital. Area 2,457 sq. m. Pop. (1954) 525,669.

Haute-Loire. Dept. of France. In the south-central part of the country, it includes the mts. of the Cévennes, Vivarais, Velay, and other ranges. The Loire is the chief river, others being the Allier, Borne, and Lignon. Much of the land is forested; the soil is not very fertile, but coarse cereals—rye, oats, etc.—are grown. Cattle, goats, etc., are reared and some coal is mined. Le Puy is the capital. Area 1,930 sq. m. Most of Haute-Loire was in the old prov. of Languedoc. Pop. (1954) 215,577.

Haute-Marne. Dept. of France. Contiguous with the depts. of Aube, Marne, Meuse, Vosges, Haute-Saône, and Côte d'Or, it was part of the old province of Champagne. Towards the S., the plateau of Langres and the Monts Faucilles form a hilly region, rising at points to over 1,600 ft. The river Marne rises here and flows northward through the dept.

Cereals are widely grown, and there are large woods, vineyards, and grazing land. The extensive industries include iron-foundries and factories making cutlery and other steel goods. The capital is Chaumont. Area, 2,420 sq. m. Pop. (1954) 197,147.

Hautes-Alpes. Dept. of France. Contiguous with the depts. of Savoie, Isère, Drôme, and Basses-Alpes, it is bounded on the E. by the Italian frontier. It is entirely mountainous, its highest point being the Barre des Écrins 13,460 ft. It has no important industries. Small-scale agriculture is carried on here and there. The rivers Durance and Buech rise in the dept., and there are many small

mountain torrents. Gap is the capital, other towns being Briançon, Embrun, and Veynes. Area, 2,178 sq. m. Pop. (1954) 85,067.

Haute-Saône. Dept. of France, in the E. of the country. In the N.E. are the Vosges Mts., with the Ballon de Servance, 4,000 ft. high. The chief river is the Saône; others are its tributaries, the Amance, Salon, and Ognon. The dept. is an agricultural area. Cereals and the vine and other fruit are grown; many cattle are reared. A good deal of the land is forested. Vesoul is the capital. Area 2,074 sq. m. Pop. (1954) 209,303.

Haute-Savoie. Dept. of France. In the S.E. of the country, it borders Lake Geneva and has a frontier with Switzerland and Italy. It is mountainous, containing Mont Blanc, and is consequently not very fertile. There is some agriculture in the valleys, and many sheep are pastured. The vine is grown, and white wines are produced. Annecy is the capital. Chamonix, Cluses, Evian-les-Bains, Thonon-les-Bains are other towns. The principal rivers are the Arve and other tributaries of the Rhône. Haute-Savoie was the stronghold of the Maquis (q.v.). Area 1,775 sq. m. Pop. (1954) 293,852.

Hautes-Pyrénées. Dept. of France. It is contiguous with the depts. of Basses-Pyrénées, Gers, Haute-Garonne, and is bounded on the S. by the Spanish frontier. The southern part is extremely mountainous, embracing a large part of the central Pyrenees, but the flat country N. of Tarbes is fertile; cereals and the vine and other fruits are grown. The chief rivers are the upper reaches of the Adour, Gave de Pau, Baise, Gers, and Neste d'Aure. Tarbes is the capital; other towns of note are Lourdes, Bagnères-de-Bigorre, Lannemezan, Vic-en-Bigorre, and Aureilan. The grand mountain scenery attracts many visitors; Gavarnie, on the upper Gave de Pau, has the finest of the Pyrenean *cirques*, or vast natural amphitheatres. Area, 1,750 sq. m. Pop. (1954) 203,544.

Haute-Vienne. Dept. of France. It is contiguous with the depts. of Vienne, Indre, Creuze, Corrèze, Dordogne, and Charente, and is especially hilly towards the S.W., where lies a part of the Montagnes du Limousin. Cereals, chestnuts, sheep, and cattle are the chief agricultural products. Porcelain, boots, paper, and liqueurs are made. The Vienne enters the dept. at its easternmost corner and flows W. tributaries in the dept. being

the Taurion and Briance. The Garieppe flows across the N.; the Isle, Dronne, Tardoire, and Charente rise in the dept. There are three arrondissements. Limoges is the capital, other towns being Bellac, Le Dorat, St. Junien, and St. Yrieix-la-Perche. At Chalusset, 10 m. S. of Limoges, is the ruined castle of the viscounts of Limoges. Area, 2,119 sq. m. Pop. (1954) 324,429.

Hautmont. Town of France. In the dept. of Nord, it is 18 m. E.S.E. of Valenciennes, and makes glass, pottery, etc. Pop. (1954) 15,978.

Haut-Rhin. Dept. of France. Constituted with the other depts. in 1790, Haut-Rhin was annexed by Germany in 1871, except for the arrondissement of Belfort, which became the territory of Belfort (q.v.). Under German rule Haut-Rhin formed the district of Ober-Elsass (Upper Alsace). It was restored to France in 1919. Its capital is Colmar. Guebwiller and Mulhouse are other large towns. Haut-Rhin was the scene of fierce fighting in 1944-45. Area, 1,354 sq. m. Pop. (1954) 509,647.

Haüy, René Just (1743-1822). French mineralogist. Born in St. Just, Oise, Feb. 28, 1743, he was educated for the Church, but while teaching in Paris he became interested in mineralogy. In 1781 he discovered the geometric law of crystallisation, and two years later he was elected to the academy of sciences. Becoming professor of mineralogy at the museum of natural history in Paris, 1802-14, Haüy made

a magnificent collection of crystals and wrote extensively on the subject. In addition to his works on crystallography, Haüy took a prominent part in the introduction of the metric system into France. Among his best known works are *Traité de Minéralogie*, 1801; *Traité Élémentaire de Physique*, 1803; *Traité des Caractères Physiques des Pierres Précieuses*, 1817; and *Traité de Cristallographie*, 1822. Haüy died in Paris, June 3, 1822.

Haüyne or **HAÜYNITE.** A member of the feldspathoid group of minerals, named after René Haüy

(v.s.) It is a sodium aluminium silicate, with calcium sulphate ($3\text{NaAlSi}_3\text{O}_8 \cdot \text{CaSO}_4$), forming blue

crystals with cubic symmetry; often as rounded grains and associated with nepheline or leucite. Haüyne occurs as a constituent of certain igneous rocks, mostly of volcanic origin, that are characterised by a low silica content but are rich in alkalis, such as those of Vesuvius, Eifel, etc.

Havana (Span. La Habana). Largest city of the W. Indies. The capital of Cuba, it is situated on the N. coast, on one of two peninsulas forming the harbour, and is a busy commercial centre. It has an excellent rly. service, being linked both by rly. and by motor road with all the chief towns on the island. The bay of Havana is one of the securest harbours in the world, and there is a regular steamship service to New York,

Liverpool, and Tampa, Florida. It is an important air traffic centre. Havana consists of old and new



Havana. Plan of the capital city of Cuba, showing the entrance to the harbour and the quays

towns. The former lies within the limits of the old walls, built between 1671 and 1740 and almost wholly dismantled between 1803 and 1880, and is narrow and cramped. The new town is built on more spacious lines, and generally presents a clean and ordered appearance, with fine promenades, squares, and streets, some of them lined with trees. El Morro and the Castillo del Principe belong to the city's fortifications.

The principal buildings include the cathedral, completed 1724, in which the remains of Columbus reposed before their transference to Spain in 1898; the university, the Jesuit College de Belen, the massive Tacón or national theatre, the old palace in which the president resides, the opera house, the bishop's palace, the admiralty, and the national library, housed in the Maestranza, the former arsenal. The Prado is a wide promenade, fashionably frequented. The residential suburb of Vedado is reached by a good sea wall roadway. Pop. (1953) 783,192.



Havana. The handsome Prado (Paseo de Martí), with the tower of the fortified Morro Castle, just visible in the distance. Upper picture, the Capitol

The staple industry of Havana is the manufacture of cigars and tobacco. Sugar is also produced in large quantities, and other manufactures include barrels and cases for the cigar and tobacco supplies, and carriages, wagons, and machinery. These, with oil, rum, honey, wax, and fruit, are the chief articles exported, the imports consisting mainly of grain, flour, food-stuffs, and cotton.

Founded by the Spaniards in 1515 on the S. coast, Havana was removed to its present site in 1519, when it was known as San Cristobal de la Habana or Savanna. It frequently suffered at the hands of pirates in the 16th century, and was the object of Dutch attack in the following century. In 1762 it was captured by the English after a lengthy siege, but was restored to Spain at the peace of 1763. On Feb. 15, 1898, the Maine was blown up in the harbour, the incident leading to the Spanish-American War, during which Havana was blockaded by the American fleet.

Havana, ACT OF. Convention between the Pan-American states reached at a conference at Havana, 1940, by which they agreed to take immediate action in the event of any attempt to transfer the sovereignty of any British, French, or Netherlands possession in the W. hemisphere from one non-American power to another, and to establish a joint trusteeship over such possession. See Pan-American Conference.

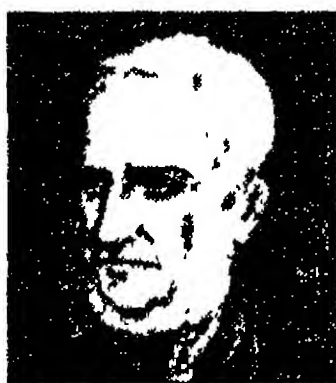
Havant. Town of Hampshire, England. It stands on Langstone Harbour, 7 m. N.E. of Portsmouth and 67 m. S.W. of London by electrified rly., and is the centre of the urb. dist. of Havant and Waterloo. The chief building is the old parish church of S. Faith, restored in the 19th century but with some Early English work. Havant is of pre-Roman origin, and is mentioned in Domesday Book. A road bridge opened in 1956 connects Havant with Hayling I. Pop. of urb. dist. (1951) 32,484.

Havas Agency (*Agence Havas*). French news agency. Founded in 1825 by Charles Havas, a journalist who specialised in translations from foreign newspapers, and continued by his son, Auguste Havas, it was converted into a company July 24, 1879, with a capital of 8,500,000 francs, M. Favier being president and M. Lebey director.

Havel. River of N. Germany. Originating in a lake near Neu-Strelitz, it flows S.E. and S. to Spandau, where it is joined by the

Spree, and Potsdam, turning thence roughly W. to Brandenburg and N.W. to its junction with the Elbe, near the point where the latter river makes its final bend N.W. towards Hamburg and the North Sea. Navigable as far as Fürstenburg, 30 m. from its source, the Havel is important in the waterways system of N. Germany.

Havelock, SIR HENRY (1795-1857). British soldier. The son of William Havelock, a shipbuilder, he was born at Sunderland, April 5, 1795. Educated at Charterhouse School, he studied law until 1815, when he entered the Rifle Brigade. In 1823 he transferred to an



H. Havelock

Indian regiment, two of his brothers being officers in India. His first experience of active service was in Burma (1825-26), after which he was in the Afghan War, where he fought in most of the operations in and around Kabul. He fought against the Mahrattas and the Sikhs, and was made, 1854, adjutant-general of troops in India.

In 1857 Havelock held a command in the short war against Persia, and on the outbreak of the Mutiny went with a force to crush the mutineers. In a succession of fights he showed great skill, but he was unable to relieve Cawnpore, while he only got through to Lucknow when reinforced by troops under Outram. He had just taken that city and been knighted when he died there of dysentery, Nov. 24, 1857. He was created a baronet Nov. 26, his death not being yet known. A baronetcy was conferred on his eldest son, Sir H. Havelock-Allan. Havelock, a sincere if somewhat narrow Christian, belonged to the Baptist denomination. He published his *Memoirs of the Afghan Campaign* in 1839. Consult *Memories of Havelock*, J. C. Marshman, 1860; *Life*, L. Cooper, 1957.

Haverfordwest (Welsh, Hwlfordd). Bor., market town, and port of Wales, in Pembrokeshire, of

which it is the county town. It stands on the W. Cleddau river, 8½ m. from Milford, and is served by railway. A county of itself, it has its own assizes, quarter sessions, and sheriff. The town proper is on the W. of the river, hence the west added to the earlier name; on the E. are the suburbs of Cartlet and Prendergast. The chief buildings are the churches of S. Mary, S. Martin, and S. Thomas. Two bridges cross the river. The dominating feature of the town is the keep of the castle, built by one of the Clares in the 12th century. There are remains of an Augustinian priory. There is a trade by river in coal and agricultural and other produce; and an airport 1 m. from the centre of the town.

Haverfordwest was settled by Flemings in the 12th century. It obtained various privileges, and in 1485 it became a corporate town. Its rights as a county date from 1536. A stronghold of the English, it was several times attacked by the Welsh. After the pacification of Wales it became a flourishing port and with the arrival of the main G.W.R. line to Neyland retained its position as the princi-



Haverfordwest. Prendergast Street in this Pembrokeshire town, showing the castle on the hill beyond

pal distributive centre of the co. Market days, Tues. and Sat. Pop. (1951) 7,266. Pron. Harfordwest.

Havergal, FRANCES RIDLEY (1836-79). British poet and hymn-writer. Born at Astley, Worcester-shire, Dec. 14, 1836, daughter of the Rev. William Henry Havergal, writer of sacred music, she began to write verse at the age of seven. She



F. R. Havergal

is chiefly remembered as a writer of hymns. An edition of her

poetical works appeared in 1884. She died June 3, 1879. *Consult* memoir by T. H. Darlow, 1928.

Haverhill. Market town and urban dist. of Suffolk. It is 16 m. S.E. of Cambridge on the railway and 55 m. N.E. of London. It is the terminus of the Colne Valley line. The chief building is the restored church of S. Mary. Cloth, rope, brushes, chemicals, telecommunication equipment are made; there is trade in agricultural produce. Market, Friday. Pop. (1951) 4,096.

Haverhill. City of Massachusetts, U.S.A., in Essex co. It stands on both sides of the Merrimac at the head of navigation, 32 m. N.E. of Boston, and is served by the Boston and Maine rly. There are five lakes within the city limits, and several bridges cross the river. An important industrial centre since colonial days, Haverhill is the world's greatest producer of women's shoes, and also manufactures other types of footwear as well as soles, heels, lasts, ornaments, and other accessories. There are tanneries, woollen mills, and hat factories; boot-and-shoe and other types of machinery, bricks, and boxes are also produced. Haverhill is the trading centre of the surrounding dairying and market-gardening region, and is the site of Bradford junior college, a girls' school founded in 1803, Haverford academy, with notable Shakespeare and J. G. Whittier collections, and a museum commemorating Whittier, who was born here. Originally called Pentucket, Haverhill was later renamed after the English birthplace of the Rev. John Ward, one of the settlement's leaders. Settled in 1640, Haverhill, incorporated in 1645, received a city charter in 1869. Pop. (1950) 47,280.

Haversack (Ger. *hafer*, oats). An oatsack or nosebag. Haver remains a common name for oats in Scotland, especially in the compounds havermeal and havercakes. As part of a soldier's equipment, the haversack was a canvas web bag carried, in full marching order, on the left hip and containing the man's rations, mess-tin, and small kit, i.e. toilet and cleaning articles; in field service order, on the back as a small pack, containing water-bottle and ground sheet in addition to the other articles.

Haversian Canals. Minute canals, running lengthwise through bones, containing blood-vessels. They are named after an English physician, Clopton Havers (c. 1650-1702).

Haverstock Hill. London thoroughfare, mainly residential. It connects Chalk Farm with Rosslyn Hill, Hampstead. Belsize Park station on the Northern line is here; near by is Hampstead town hall, built in 1877.

Havoc. U.S. military aeroplane of the Second Great War. The name Havoc was first given to the R.A.F.'s night fighter version of the Boston (*q.v.*) light bomber, and later to the same aeroplane, either as bomber or fighter, when used by the U.S. army air forces. *See* Aeroplane illus., p. 131.

Havre or **Le Havre.** Seaport town of France, chief town of the dept. of Seine-Maritime. It lies on the N. bank of the Seine estuary, 49 m. W. of Rouen, and 143 m. W.N.W. of Paris, with which it is connected by the main Nord line. The town, almost entirely modern with broad, well laid-out main streets running E. and W., suffered severely in the Second Great War. The hôtel de ville was a handsome modern building in French Renaissance style, as also was the exchange; other public buildings included a theatre, palais de justice, prison, Kléber barracks, three museums, totally destroyed. By 1957 the town was rebuilt, to a new and bolder plan.

Of a number of churches in the town, the principal was that of Notre Dame, built originally 1575-



Havre arms

1600. The large rly. station had extensive goods yards, and all the principal quays and dock warehouses were connected by rly. Havre had im-

portant engineering works, shipbuilding yards, oil refineries, chemical and dye works, a state tobacco factory, and many miscellaneous industries.

Havre, second greatest of French seaports, is the main centre of trade with N. America, and the docks were extensive and well constructed. Out of the outer harbour, to the N., opened the 17th century Bassin du Roi. The chief dock of the inner harbour was the Bassin de l'Eure, 1848-56, with an area of over 70 acres, used by the liners of the Compagnie Générale Transatlantique; the Bassins Vauban and Bellet were also notable. The port trades chiefly in coal, cotton, cereals, woods, sugar, coffee, and cocoa. Pop. (1954) 139,810.

Louis XII founded the chapel of Notre Dame de Grâce in 1509, whence came the town's old name of Havre-de-Grâce. Fortifications were built and the harbour enlarged by Francis I, 1516, with a view to English wars, but it was handed over to Elizabeth I by



Havre. Views of this second greatest of French seaports, before (upper) and after (lower) the Second Great War. Overrun by the Germans in 1940, it became a German port for the intended invasion of England. When the Germans capitulated, 1944, the city was completely devastated

Condé, 1562. Recovered in 1563, it was developed by Richelieu and Colbert, and in time became a serious rival to the English ports. It was bombarded by the English a number of times between 1694 and 1795. In 1672 it became the entrepôt of the French East India Co.

During the First Great War, Havre was a base of the British Expeditionary Force, crowded with military works, the port thronged with shipping: tonnage disembarked in 1916 was nearly double that of 1913. Havre was also the seat of the Belgian government, Oct., 1914, to Nov., 1918.

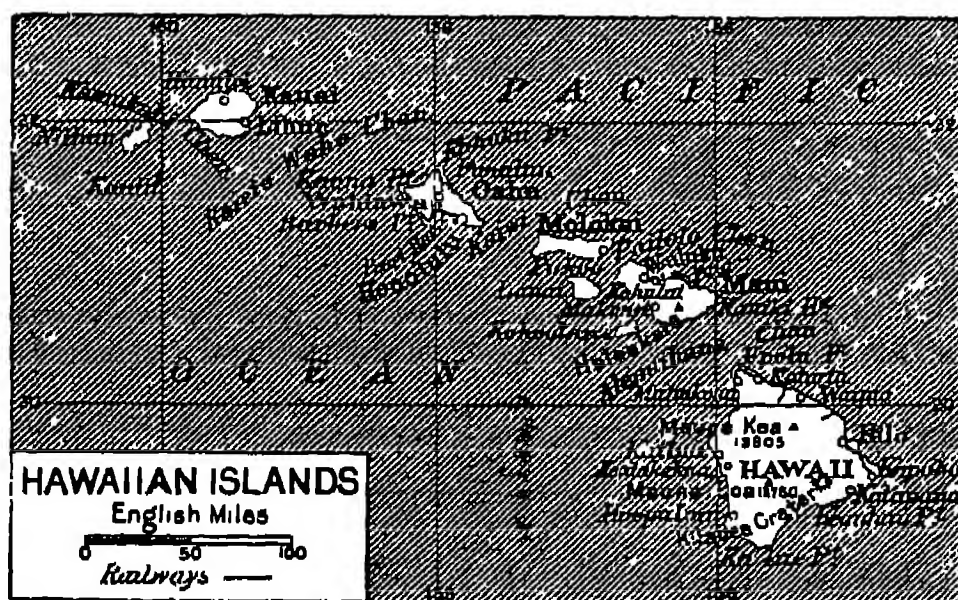
In the Second Great War, Havre was again a base of the B.E.F.; it was overrun by the Germans on June 14, 1940, and, becoming a German port for the intended invasion of England and an E-boat base, was frequently bombed by the R.A.F. A specially heavy air attack was made on D-day (June 6, 1944) against a concentration of E-boats in the harbour there. The 1st Canadian army's rapid advance beyond the Seine isolated Havre by Aug. 31; but its German garrison offered a stubborn resistance. Between Sept. 5 and Sept. 12, the R.A.F. dropped 9,500 tons of bombs on Havre, while H.M.S.S. Warspite and Erebus poured 500 rounds of 15-in. shells into it. In the final assault, by British troops of the 1st Canadian army, flail tanks and flame throwers led infantry through deep minefields to a bitter 36-hour struggle. When the Germans capitulated on Sept. 12, the city was completely devastated.

Hawaii or OWYHEE. Principal island of the Hawaiian Islands described below in fuller detail. It has an area of 4,021 sq. m.

Hawaii. Territory of the U.S.A., consisting of the Hawaiian Islands, a chain in the Pacific Ocean formerly called the Sandwich Islands (the name Hawaii being the English approximation of the native *Owyhee*.) They lie more than 2,000 m. from the mainlands of both N. America and Asia. They consist of eight inhabited and some smaller uninhabited islands of volcanic origin, contain a number of active and quiescent volcanoes, and cover an area of 6,420 sq. m. The inhabited islands are Hawaii, 4,030 sq. m.; Oahu, 604 sq. m.; Maui, 728 sq. m.; Kauai, 555 sq. m.; Molokai, 260 sq. m.; Lanai, 141 sq. m.; Niihau, 72 sq. m.; and Palmyra, 1½ sq. m. According to the U.S. census for 1950, Palmyra had 32 inhabitants; Kahoolawe, 45 sq. m., had no inhabitants,

after having had 1 in 1940 and 2 ten years earlier.

Most of the islands are girdled by coral reefs and the larger of them are mountainous, the loftiest summits, on Hawaii, being the volcanoes of Mauna Kea and Mauna Loa, 13,805 ft. and 13,760 ft. high respectively, the former being the highest peak in the Pacific. Kilauea, on the E. of Mauna Loa, is a constantly agitated lava lake about 8 m. in circumference, and the greatest active crater. Hawaii is the largest mass of volcanic material in the world; it rises 30,000 ft. from the ocean bed and consists almost entirely of



Hawaii. Map of the chain of islands in the Pacific which form a territory of the U.S.A.

lava. On Maui is Haleakala, whose crater, 19 m. in circumference, is the largest of all extinct craters. Mauna Loa, Kilauea, and Haleakala are all in the several sections of the 173,405-acre Hawaiian national park, established 1916.

The climate is agreeable, being tempered by the N.E. trade winds which prevail for three-fourths of the year. The temperature ranges between extremes of 56° F. and 88° F. and the rainfall averages about 55 ins. It is heavier in the islands to the W. At Honolulu the mean temperature is 76° F. and the annual rainfall is 32 ins. The mts. inland from Hilo Bay form, however, one of the rainiest places in the world; the annual precipitation frequently exceeds 200 ins.; here the persistent warm moisture-laden trade winds deposit their load of water. The flora is rich and diversified. The mountains are largely forest-clad, characteristic trees being the koa, koaia, candle-nut, and sandalwood. Screw-pines, ferns, and a variety of flowering plants abound, and among imported trees and shrubs are the banana, mango, pineapple, coconut, gooseberry, and tamarind. More than 1,000,000 acres are forest reserves, the total public lands covering more than 1,500,000 acres of the islands.

Mammals are few and reptiles are represented solely by the lizard, but bird species number upwards of seventy, and include many peculiar to the islands. Thousands of sheep are pastured on the lower slopes of the mountains, and beef cattle, hogs, and poultry are raised. The production of sugar is by far the most important industry, the crop representing about three-fourths of the entire products of the territory. Rice, fruits, especially pineapples and bananas, coffee, sisal hemp, hides, molasses, and musical instruments, notably the ukulele or Hawaiian guitar, are exported.

Sulphur, pyrites, sal ammoniac, copper, common salt, and other minerals occur. Most of the foreign trade is with the U.S.A., which takes more than 98 p.c. of the exports and provides more than 88 p.c. of the imports. There are 192 m. of narrow-gauge rlys.

on the larger islands, steamship service to the U.S.A., the Philippines, Asia, and Australia, and airline service with the U.S.A. and the Far East. Honolulu (*q.v.*) is the capital and chief port, and Hilo, on Hawaii, has the best harbour. The Japanese attack on the great U.S. Pacific naval base at Pearl Harbour on Oahu, Dec. 7, 1941, brought the U.S.A. into the Second Great War. Pearl Harbour and Schofield Barracks, both near Honolulu, are the greatest U.S. naval base and military post.

The indigenous population, belonging to the brown Polynesian race, are of good physique and handsome. In language and religion they are related to the Tahitians. The majority are Christians, missionaries having arrived in 1820, and, with traders, reoriented the islanders towards the U.S.A.

The pop. was 499,794 in the 1950 census, an increase of 76,464 over the pop. at the census of 1940. The 1950 figure included 184,732 Japanese, 81,911 Caucasians, 90,079 Hawaiians and part Hawaiians, 61,040 Filipino, 30,566 Chinese, 10,351 Puerto Ricans, and 7,624 Koreans. Old age pensions are paid to the needy at 65.

Beginning in 1868, the sugar planters imported large numbers of Japanese labourers because of their

cheapness. By 1924, when an Immigration Act stopped this traffic, 180,000 Japanese—the largest group of emigrants from Japan—had settled in Hawaii. The Japanese born and bred in Hawaii showed enterprise in entering business and the professions, and eventually formed a large part of the black-coat workers. After the Pearl Harbour attack, the Japanese in Hawaii were not interned, but, under martial law, most of their business and other activities were suspended. By Aug., 1943, 1,479 suspected spies and saboteurs had been interned, most of them Japanese, but the bulk of the Japanese population proved loyal to the U.S. and 2,600 Nisei, or second-generation Japanese born and reared in Hawaii, volunteered for the U.S. army and, fighting in a special unit, won distinction in Italy.

Leprosy and tuberculosis have much reduced the native race;

voluntarily ceded their sovereignty to the U.S.A. The territorial governor, who must have been a resident of the islands for three years to be eligible for the office, is appointed for a four-year term by the president of the U.S.A. with the consent of the U.S. senate. The territorial legislature consists of a



Hawaii. 1. Cutting cane on a sugar plantation. 2. Natives gathering pineapples, of which large quantities are exported to the U.S.A.

both diseases are the subject of constant medical attention. In 1885 a leper settlement was established on Molokai island.

Reliable history of the Hawaiian Islands dates from their discovery, or rediscovery, in 1778 by Captain Cook, who was killed by natives in Kealahakua Bay the following year. It is, however, generally accepted that they were visited by Gaetano in 1542 or 1555, while he is thought to have been preceded by survivors of a wrecked Spanish vessel in 1527. The islands were ruled by native kings down to 1891, then by Liliuokalani (1838-1917), the sister of the last monarch. She was deposed in 1893, and a provisional government was formed, the islands seeking unsuccessfully to be annexed by the U.S.A. In 1894, they were constituted a republic; and in 1898

senate of 15 members elected for four years and a house of representatives of 30 members elected for two years. The territory sends to the U.S. congress for a two-year term a delegate who has the privileges of the floor of the house of representatives but no vote.

Hawaii has long sought admission to the union as the 49th state, as has also Alaska. A majority of Hawaiian voters approved another petition for statehood at the 1940 election. The university of Hawaii in Honolulu was established in 1907.

Marie McGowan

Hawara. Village of Upper Egypt, 6 m. S.E. of Medina, in the Fayum. A mud-brick pyramid, once limestone-cased, was identified by Petrie in 1888 as that of Amenemhat III of the XIIth dynasty. The adjacent funerary tem-

ple was the Labyrinth described by Herodotus. Some tombs dated A.D. 100-250, of the Roman period, yielded mummy-portraits on canvas or wood, the finest being now in the National Gallery, London.

Hawarden. Parish and market town of Flintshire, Wales. It stands on a tributary of the Dee, 6 m. W.S.W. of Chester, with its own railway station. There are remains of a 13th century castle, close to which is the modern Hawarden Castle, long the residence of W. E. Gladstone. The church, dedicated to St. Deiniol, has memorials to the Gladstones, and here is St. Deiniol's library and hostel for theological students founded by Gladstone. The building was erected as part of the national memorial to him. The old castle was long the seat of the Stanleys. In the 17th century it came to John Glynn, the lord chief justice. In 1752 one of his descendants built the new castle and in 1874 this passed, on the death of her brother, Sir Stephen Glynn, Bart., to Mrs. Gladstone. The estate is still the property of the Gladstone family. Coal mines have been opened on it. The airfield was used as a test and ferry station during the Second Great War. The Welsh name is Penarlŷg. Pop. 9,230. *Prim.* Hawarden. *See* Gladstone.

Haweis, HUGH REGINALD (1838-1901). British author and preacher. He was born at Egham, Surrey, April 3, 1838, and educated at Trinity College, Cambridge. He became incumbent of St. James's, Marylebone, in 1869, where he became known as a vigorous and eloquent if somewhat sensational preacher. He was passionately devoted to music and wrote a number of stimulating works on musical subjects, among them *Music and Morals*, 1871, *My Musical Life*, 1884, and *Old Violins*, 1898. He also wrote on theological subjects. His hymn *The Homeland*, the *Homeland* achieved wide popularity. He died in London Jan. 20, 1901.

Hawera. Town of North Island, New Zealand. It is 45 m. by rly S.S.E. of New Plymouth, and is a dairying centre. Pop. (1951) 5,340.

Hawes. Market town of Yorkshire (North Riding). Served by railway, it stands at the head of Wensleydale, at a height of 850 ft., 16 m. W. of Leyburn. It has a trade in dairy produce and there is a butter market. Market day, Tues. Pop. (1951) 1,198. Near by is Hardraw Force, a well-known waterfall. Garsdale, where

the line from Hawes meets the main line, is 6 m. away. It was the scene of a terrible railway accident on Christmas Eve, 1910.

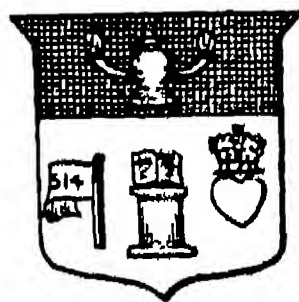


Haweswater, Westmorland. The lake looking south from Measand Beck. In the distance is Harter Fell
Abraham

Haweswater. Lake of Westmorland, England. It is 15 m. N. of Kendal. Its natural length of 2½ m. was extended to approx. 4 m. by the construction by Manchester corporation of a dam at its northern end to provide an additional source of water for the city and surrounding districts. The lake's natural water level of 695 ft. was raised to 790 ft. above sea level.

Hawfinch (*Coccothraustes coccothraustes*). Bird of the finch family, closely related to the grosbeak. Common in S. Europe, it is frequently seen in England, though rare in Scotland. It is about 7 ins. long, and is a handsome bird, with light or pinkish-brown breast, dark brown back wings banded with black, brown, and white, large yellowish-brown head, and large blue beak.

Haw-Haw, LORD. Nickname popularly given in Great Britain to the traitor William Joyce (q.v.), who broadcast regularly in English from Germany to British listeners during the Second Great War. The nickname was coined by a journalist, Jonah Barrington, for Joyce's predecessor, who broadcast for only a few days at the outset of the war; but by the time the British public generally began to be aware of the broadcasts the name was found to suit well enough the voice and manner of Joyce, and was the more generally adopted because Joyce's real identity was not then established.



Hawick arms

Hawick. Mun. burgh and industrial town of Roxburghshire, Scotland. It stands at the junction of the Slitrig with the Teviot, 53 m. S.E. of

Edinburgh on the railway. The church of S. Mary (1763) occupies the site of a former church of that name erected in the 13th century.

Among the antiquities of Hawick are the Moat, an earthen mound 30 ft. high and 310 ft. in circumference, and a portion of the Tower Hotel formerly the peel-tower of the Drumlanrig Douglasses, the only building which escaped the devastation wrought by the earl of Sussex in 1570.

In the neighbourhood are Branxholme and Harden, old residences of the Scotts, the first named the scene of Scott's Lay of the Last Minstrel. The annual "common riding" has been celebrated for



Hawick, Roxburghshire. High Street, with the statue commemorating the capture of an English standard by the Hawick callants after Flodden Field

Valentine

upwards of 300 years. The hosiery and woollen manufactures are important, and a livestock market is held. Market day, Thurs. Pop. (1951) 16,717. *Pron.* haw-ick.

The Hawick Burghs formerly returned a member of parliament, but in 1918 were merged in the parliamentary constituency formed by the two counties of Roxburgh and Selkirk.

Hawk. Name sometimes used for the group of birds called Falconidae. It includes eagles, sparrowhawks, goshawks, harriers, the common kestrel, and other birds of prey.

Hawkbit (*Leontodon*). Genus of perennial herbs of the family Compositae, natives of Europe and W. Asia. In general appearance they are much like small



Hawkbit. Foliage and flowers of *Leontodon autumnalis*

dandelions, for which they are often mistaken. They have milky juice, narrow and boldly toothed leaves, all springing from the root-stock. The flower-heads are yellow, and all the florets are strap-shaped, as in the dandelion. The hairs of the fruit-parachute are feathered. The common hawkbit (*L. hispidus*) is more or less bristly all over; the autumnal hawkbit (*L. autumnalis*) is smooth or nearly so.

Hawke, EDWARD HAWKE, 1ST BARON (1705-81). British sailor. Born in London, he entered the navy in 1720. He served in N. America and the West Indies until 1727, becoming commander in 1733. Six years later he commanded the Portland off Barbados and N. America, and in 1743 was promoted to the Berwick, in which he sailed

to the Mediterranean, and took part in the battle off Toulon, 1744.

In command, 1747, of 14 ships of the line off Ushant and Finisterre, Hawke intercepted off Rochelle a French squadron of nine warships, with three merchantmen which tried to escape. Hawke attacked from the rear, capturing all but two vessels, and was knighted for his services. Elected M.P. for Portsmouth in 1747, he was promoted vice-



Hawke

After F. Colles, R.A.

admiral in 1748 and commanded the home fleet until 1755, when he became commander-in-chief at Portsmouth. In 1756 he superseded Admiral Byng in the Mediterranean, but was too late to avert the loss of Minorca. He became full admiral 1758.

His great exploit was in 1759 when, the French fleet under Admiral de Conflans having escaped from Hawke's blockade of Brest, he followed and utterly defeated the French in Quiberon Bay in a battle claimed as the greatest naval victory since the defeat of the Armada. It crushed French naval power and prevented any possibility of an invasion of England. Hawke was first lord of the admiralty, 1766-71, admiral of the fleet, 1768, and was made a baron in 1776. He died at Sunbury, Oct. 17, 1781. *See* Life, M. Burrows, 1883.

Hawke, MARTIN BLADEN HAWKS, 7TH BARON (1860-1938). English cricketer. The second son of the

6th baron, he was born in Lincolnshire Aug. 16, 1860. Educated at Eton and Magdalene College, Cambridge, he played cricket for both school and university. In 1881 he first played for

Yorkshire, and was captain of the county team 1883-1910, the only man ever to play regularly for Yorkshire without the birth qualification. During that time Yorkshire won the county championship eight times, Hawke scoring in all over 13,000 runs. He took out cricket teams to America in 1891 and 1894; India, 1892-93; and South Africa, 1895-96. He was M.C.C. president 1914-18. He died Oct. 10, 1938. *Consult* his Autobiography, Recollections and Reminiscences, 1924.

Hawke Bay. Inlet of North Island, New Zealand. It is on the E. coast, from C. Kidnappers in the S. to the Mahai peninsula in the N. and is c. 50 m. wide at its mouth. It gives their name to the prov. dist. and co. of Hawke's Bay (*v.i.*). It was first entered in 1769 by Capt. Cook, who named it after Admiral Sir Edward (later Baron) Hawke (*q.v.*).

Hawker. Itinerant dealer or vendor. In law, a hawker is distinguished from a pedlar as one who conveys his goods by horse or other beast, whereas the pedlar

conveys his goods on foot. Hawkers and pedlars must take out licences issued by the local authorities for their respective trades, the former costing £2, the latter 5s.

Hawker, HARRY GEORGE (1891-1921). British airman. Born in Australia, he gained his pilot's certificate in the U.K. in 1911, and soon became a noted figure in aviation. He gained the British solo altitude record in 1915, and in April, 1916, made a world's record for height (24,408 ft.) at Brooklands.

In May, 1919, he competed for the Daily Mail £10,000 prize for a trans-Atlantic flight. With Commander K. Mackenzie Grieve, in a Sopwith machine, he left St. John's, Newfoundland, in bad weather. When halfway across the aeroplane was forced to descend through engine trouble. The two airmen were rescued by a Danish steamer and landed in Scotland. They were awarded a consolation prize of £5,000 by the Daily Mail. Hawker was killed while flying, July 12, 1921.

In 1920, the Sopwith co. was reconstituted as the H. G. Hawker Engineering co., its name being later changed to Hawker Aircraft Ltd. It built the Hart bomber and Fury fighter in the years between the Great Wars, most advanced military aircraft of their time, and during the Second Great War produced the Hurricane, Typhoon, and Tempest single-seat fighters.

Hawker, ROBERT STEPHEN (1803-75). British poet and antiquary. He was born at Stoke

Damerel, Devon, Dec. 3, 1803, and educated at Pembroke College, Oxford, where he won the Newdigate prize for a poem on Pompeii in 1827. He was vicar of Morwenstow, Cornwall, 1834-75. His best known poems are *The Quest of the Sangraal* and *Cornish Ballads*. Much controversy arose round the question whether the well-known refrain, "and shall Trelawny die?" etc., of the ballad *Trelawny* was really, as he averred, sung by the miners in the days of the trial of the seven bishops. Hawker also wrote on local antiquarian topics. He died at Plymouth, Aug. 15, 1875. *See* Life and Letters of R. S. Hawker, C. E. Byles, 1905; Life, M. F. Burrows, 1926.



R. S. Hawker

Hawke's Bay. Prov. dist. and co. in North Island, New Zealand. The prov. dist. has a seaboard of 300 m. stretching from just E. of C. Runaway to just S. of C. Turnarain and has an area of 4,200 sq. m. The Ruahine range and other mountains form a continuous ridge along its length, and their peaks, 3,000 to 6,000 ft. in height, are snow-clad in winter. Mostly broken forest country, it produces chiefly timber, but sheep-grazing is also extensively followed. Its chief ports are Napier and Gisborne; Hastings, Dannevirke, and Woodville are important towns on the main line to Wellington. Pop. (1951) 91,244.

The co. of Hawke's Bay lies round Hawke Bay. Its area is 1,634 sq. m. Napier and Hastings lie in the co. Pop. (1951) 17,199.

Hawkesbury. River of New South Wales known near its source as the Wollondilly, later as the Warragamba and Nepean, finally the Hawkesbury. About 335 m. long, it drains a basin 9,000 sq. m. in area and falls into Broken Bay 25 m. N.N.E. of Sydney. It is one of the chief of the east flowing rivers. A weir built on the Warragamba in 1940 to provide an emergency water supply for Sydney was replaced by a dam erected to create a major water storage and hydro-electric station.

Hawking, OR FALCONRY. The art of hunting with trained hawks or falcons. One of the oldest and most universal of sports, it was known in China about 2000 B.C., and is mentioned as prevalent in Europe by Aristotle, Pliny, and Martial. In Great Britain, hawking was practised in Saxon times, as is shown by various illustrated MSS. of the period in the British Museum; in the Bayeux tapestry (*q.v.*) Harold has a hawk upon his wrist. Always a royal and aristocratic sport, hawking was probably at the height of its popularity during the reign of Elizabeth I. Her chief falconer was Sir Robert Sadler, who trained hawks for his royal mistress at Everley, Wiltshire.

The sport was a favourite theme with early British writers. Dame Juliana Berners's celebrated Book of St. Albans contains a treatise on Hawkyng and Hunting, 1486; George Turberville wrote: *The Booke of Falconrie or Hawking, 1575*; and these were followed by Simon Latham's *The Falcon's Lure and Cure, 1615-18*; Edmund Bort's *An Approved Treatise on Hawks and Hawking, 1619*; and Richard Blome's *The Gentleman's Recreation, 1686*.

The hawks employed are of two groups, the long-winged and the short-winged, the former being termed "hawks of the lure," and the latter "hawks of the fist." The long-winged comprise the peregrine, the northern falcon, and the Iceland and Greenland varieties; the short-winged consist of the goshawk and sparrowhawk. The birds should be taken for training when they are just fledged but have not left the nest. The female bird, being the larger, is invariably chosen.

The several implements used in the confining and training of hawks are the hood, jesses, bells, the lure, blocks, and the cadge. The hood is the principal means by which a hawk is controlled, and a bird once thoroughly accustomed to wear it can be taken anywhere and handled quite easily, always remaining at rest when hooded. Jesses are two short strips of leather placed round the hawk's legs, to which the leash by which the bird is held is attached. Bells are affixed, one to each leg, just above the jess; and are of great assistance in locating the hawk when the quarry has been killed out of sight.

The lure also plays an important part. A good lure can be made of a horseshoe well padded and covered with leather. This is in turn covered with the wings of a wild duck, and strings are attached, to which the meat, constituting the bird's food, is tied. The lure serves the double purpose of familiarising the bird to its prey and accustoming it to come to hand readily. On his left hand the falconer wears a leather glove, for protection from the hawk's claws when the bird is resting upon it. European falconers always carry the hawk on their left hand; in the East it is carried on the right.

Blocks are portions of tree trunks firmly fixed in the ground, upon which the hawks sit when at rest and to which they are secured by the leash. The cadge consists of four pieces of wood, padded and fixed together in the form of an oblong frame, on which the birds perch when being carried from one place to another. Hawks are trained to kill various kinds of game, such as grouse, partridges, and woodcock, and occa-

sionally hares and rabbits. A good dog is essential to assist in starting and retrieving the game. Consult *The Art and Practice of Hawking*, E. B. Michell, 1900.

Hawkinge. Village of Kent, England, 3 m. N. of Folkestone. There is an ancient church, dating partly from Norman times. An R.A.F. aerodrome here was a base for fighters in the Second Great War, and after the war it became an administrative and training centre for the W.R.A.F.

Hawkins OR **HAWKYNS**, SIR JOHN (1532-95). English sailor. Second son of William Hawkins, a sea captain, he was born at Plymouth and was admitted a freeman of that city in 1556. Until 1561 he was engaged in voyages to the Canary Islands. In 1562, in command of three vessels, he sailed to Sierra Leone, seized 300 negroes, and shipped them to Hispaniola, where he exchanged them for merchandise, which he brought to England and sold to great advantage. Backed by persons of influence, he sailed again from Plymouth, on the *Jesus of Lübeck*, with three other vessels, in 1564, obtained another cargo of negroes and transported them to Venezuela, where, after some difficulty, he disposed of them to the Spaniards.

The success of these voyages induced Hawkins to fit out another expedition in 1567, and he sailed on the *Jesus* with five other vessels, one of which, the *Judith*, was commanded by Francis Drake (*q.v.*). At Sierra Leone he plundered Portuguese vessels of a vast sum of money and goods, and with a cargo of 500 negroes crossed to S. America, trafficked with the Spaniards, and was finally driven by bad weather into the Mexican port of Vera Cruz.

The arrival of a Spanish fleet caused friction with the English, which soon developed into a fight, in which Hawkins lost the greater part of his treasure, and saved but two boats, in which, after great hardships,

he reached England. He had left many of his shipmates in the hands of the Spaniards, but by a curious piece of cunning, in which he was seconded by Burghley (*q.v.*), he secured their release in 1572, and at the same time was offered a bribe of £40,000 from the king of Spain to enter his service. He accepted the bribe but remained loyal to Elizabeth. In the same year he was M.P. for Plymouth and became treasurer and comptroller of the navy, using his knowledge of seamanship to introduce many improvements. At this time he entered into partnership in a shipbuilding business with Richard Chapman of Deptford, making thereby a fortune.

On the coming of the Armada, 1588, Hawkins as rear-admiral was in command of the *Victory*, one of the new vessels which had been built at his Deptford shipyard under his own supervision, and did excellent service, especially off the Isle of Wight, for which he was knighted on the deck of the *Ark*. In 1590, together with Frobisher, he undertook a cruise to Portugal; in 1592 he founded the Sir John Hawkins Hospital at Chatham, and in 1595, under the command of Drake, he sailed once again to the Spanish Main, where he died of fever, off Puerto Rico, Nov. 12, 1595, and was buried at sea. In accordance with his will a monument was erected to his memory in the church of S. Dunstan-in-the-East, London, in which parish he had lived for thirty years. Consult *A Sea-Dog of Devon*, R. A. J. Walling, 1907; *Sir John Hawkins*, P. Gosse, 1930.

Hawkins OR **HAWKYNS**, SIR RICHARD (c. 1562-1622). English sailor. The only son of Sir John Hawkins, he sailed to the W. Indies in 1582 under the command of his uncle, William Hawkins. Three years later he was captain of the *Duck* galliot in Sir F. Drake's expedition to the Spanish Main and the coast of Florida. He commanded the *Swallow* in the fight against the Armada, 1588, and in 1593 set sail in the *Dainty* for a voyage round the world.

Passing the Straits of Magellan, he plundered Valparaiso, 1594, and later was caught in the bay of San Mateo by two large Spanish galleons. After a fierce fight he was overpowered and taken prisoner to Lima, whence in 1597 he was sent to Spain and kept captive until 1602. He was knighted in 1603, and became M.P. for Plymouth and vice-admiral of Devon in 1604. In 1620 he sailed under Sir



Sir John Hawkins,
English sailor
From an old print



Hawking. Falcon with
Dutch hood, bells, and
jesses, as carried on glove

Robert Mansell as vice-admiral in the fleet which was sent against the corsairs of Algiers. He died in London, April 17, 1622. His Observations, ed. J. A. Wilkinson, were published 1934.

Hawkite. Name of an explosive. The hawkites form a series of permitted explosives containing 50-70 p.c. ammonium nitrate and sensitised with T.N.T. These explosives are of several types and are used in coal getting.

Hawk Moth. Popular name for the moths belonging to the family Sphingidae. They have long, narrow fore-wings, and small hind ones, and the antennae end in a hook. They chiefly fly in the evening, and some species have a



Hawk Moth. *Sphinx ligustri*, the privet hawk moth

habit of hovering in the air. Their caterpillars are always smooth, and usually have a horn-like process on the hindmost segment of the body. About ten species are natives of Great Britain, among the best known being the death's head (*Acherontia atropos*), the privet hawk (*Sphinx ligustri*), and the humming-bird hawk (*Macroglossa stellatarum*) moths. The last is often mistaken for a hummingbird, as it hovers before the flowers and sips the nectar with its long proboscis. See Death's Head Moth.

Hawk's-beard (*Crepis capillaris*). Small annual herb of the family Compositae. It is a native of Europe and the Canaries. The leaves grow chiefly from the root, with few bold teeth; the stem leaves are broader at the base, with ears. The stem is branched, bearing small yellow flower-heads with the florets all strap-shaped. The



Hawk's-beard. Left, flower-heads and florets; right, toothed leaves growing from root

fruits have a parachute (pappus) of unbranched silky hairs.

Hawkshaw, Sir JOHN (1811-91). British engineer. Of a Yorkshire yeoman family, he was educated at Leeds grammar school. After residence in Venezuela (1831-34), he undertook work in the German railway surveys. Settling in London as a consulting engineer in 1850, he had a part in many important undertakings, constructing Charing Cross and Cannon Street stations and bridges, and building part of the Inner Circle underground rly., the E. London rly., and the tunnel under the Severn. Elected F.R.S. 1855, and knighted in 1873, in 1875 he was president of the British Association. He died June 2, 1891.



Sir John Hawkshaw, British engineer

Hawkshead. Town and parish of Lancashire, England. It is picturesquely situated in a valley between Lakes Windermere and Coniston. Wordsworth attended the grammar school founded by Archbishop Sandys in 1585. St. Michael's church is mainly Elizabethan with some Norman work; restored 1876, it has an altar tomb with effigies. Pop. 575.

Hawksmoor, NICHOLAS (1681-1736). English architect. Born at E. Drayton, Notts, he became a pupil of Sir Christopher Wren (q.v.), assisting him in the design for St. Paul's cathedral. He succeeded Wren as surveyor-general of Westminster Abbey. Hawksmoor designed the churches of St. Alphege, Greenwich; St. George, Bloomsbury; St. George's-in-the-East; St. Anne, Limehouse; and St. Mary Woolnoth, considered his best work. He also restored Beverley Minster and certain Oxford colleges, was surveyor of the 50 new London churches built towards the close of Anne's reign, and assisted Vanbrugh in the design of Castle Howard, Yorks. He died March 25, 1736. Consult Hawksmoor, H. S. Goodhart-Rendel, 1924; Georgian London, J. Summerson, 1946.

Hawkweed (*Hieracium*). Large genus of perennial herbs of the family Compositae. Natives of the N. temperate and Arctic regions, they have milky juice and alternate leaves. The flower-heads are yellow or orange with the florets all strap-shaped. One of

the best known species is the mouse-ear hawkweed (*H. pilosella*), common on banks, and a pest in lawns, with downy, lance- or spoon-shaped leaves and solitary pale-yellow flower-heads.

Hawkwood, Sir JOHN (d.1394). English soldier. His birth and parentage are uncertain, but he was probably a London apprentice. He won fame in the wars of Edward III, being made a knight. After the peace of Brétigny, in 1360, he became the captain of a band of mercenaries, called the White Company, at the head of which he fought for the Visconti, Pisa, and for and against the pope. In 1375 Florence bought his services, and save for one or two intervals, he remained in that city's pay until his death. He died in Florence; later his remains were carried to England, and were probably buried at Castle Hedingham, in Essex.

Haworth, Sir (WALTER) NORMAN (1883-1950). British scientist. Born March 19, 1883, at Chorley, Lancs, he was educated at Manchester and Göttingen univs. Professor of chemistry and director of the chemistry dept. at Durham, 1920-25, and Birmingham, 1926-48, he was vice-principal of the latter univ., 1947-48. He shared the 1937 Nobel prize for chemistry for work on carbohydrates and immunity to disease, and on vitamin C which he synthesised. Elected F.R.S., 1928, he received the Royal medal of the Royal Society, 1942, for research on sugars. He died March 18, 1950.

Haworth. Village of Yorkshire (W. Riding), England. It is situated within the borough of Keighley. Its chief associations are with the Brontës (q.v.), and the Haworth Round established by the Rev. William Grimshaw, rector of Haworth, 1742-63, and incorporated with Methodism, under John Wesley. Ponden Hall,

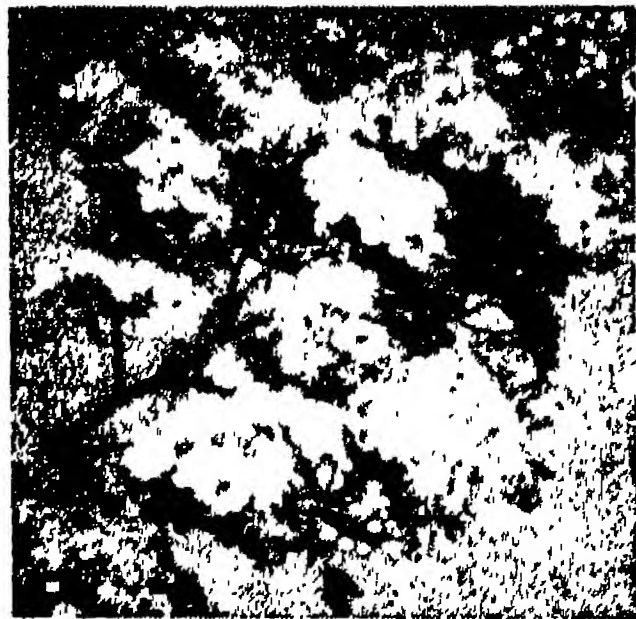


Hawkweed of the Mouse-ear variety, *Hieracium pilosella*

on the hill-top above the village, is regarded as the original of Emily Brontë's *Wuthering Heights*. The 14th century parish church, of which Patrick Brontë was curate, 1820-61, was, with the exception of the tower, demolished and rebuilt in 1879-81. Near the churchyard, where Charlotte and Emily Brontë are buried, is the Black Bull inn, frequented by Branwell Brontë. The Brontë museum, opened 1895, was transferred to the old parsonage, 1928.

Hawser (Fr. *hausser*, to raise). Stout rope used aboard ship, and by tugs for towing purposes. The hawse (Icelandic *háls*, neck) holes are the two large apertures at the bows of a vessel through which hawsers and anchor chains run. The term hawser laid applies to ropes for any purpose and denotes that the construction is of three strands, each of a number of yarns. *See Rope*.

Hawthorn, WHITETHORN, OR MAY (*Crataegus oxyacantha*). Small spiny tree of the family Rosaceae.



Hawthorn. Spray of blossom

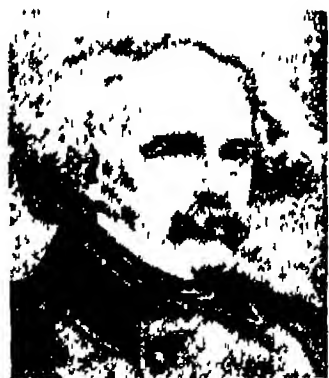
It is a native of Europe, N. Africa, N. and W. Asia. The leaves are wedge-shaped, variously cut into lobes; flowers are white, in numerous clusters, fragrant, almost hiding the foliage by their abundance. *See Bud illus.*, p.1520.

Hawthornden. Village of Midlothian, Scotland, 8 m. S.E. of Edinburgh. It is famous for its beautiful glen, through which the Esk flows, and for the fact that the house here was long the seat of the Drummonds. *See Drummond*, W.

Hawthornden Prize. British literary prize of £100 and a silver medal. It was founded in 1918 by Alice Warrender (born near Hawthornden, d. 1947, and an admirer of the poet W. Drummond, of Hawthornden), to be awarded annually for a work of imaginative literature by a British author not over 40 years of age. The winner is selected by a committee in June from books pub-

lished in the preceding 12 months. Edward Shanks was the first winner with *Queen of China* and other Poems, 1919. Other winners have been David Garnett (*Lady into Fox*), V. Sackville-West (*The Land*), Henry Williamson (*Tarka the Otter*), Siegfried Sassoon (*Memoirs of a Fox-Hunting Man*), Kate O'Brien (*Without My Cloak*), Charles Morgan (*The Fountain*), James Hilton (*Lost Horizon*), Robert Graves (*I, Claudius*), Graham Greene (*The Power and the Glory*).

Hawthorne, NATHANIEL (1804-64). American novelist. Born at Salem, Massachusetts, July 4, 1804,



Nath. Hawthorne Long-fellow. From 1825-39 he lived almost as a recluse, publishing his first book of short stories, *Twice Told Tales*, in 1837. In 1842 he brought out a second series. Among his later volumes of stories are *Mosses from an Old Manse*, 1846; *The Snow Image and Other Tales*, 1851; *A Wonder Book for Boys and Girls*, 1851; *Tanglewood Tales*, 1853. Several of these stories reveal a preoccupation with sin, conscience, and evil.

In 1850 appeared his masterpiece, *The Scarlet Letter*, a study of the ravages made by a secret sin of adultery in the hearts and consciences of husband, wife, and lover. This fine work of imagination, wrought with the felicity of phrasing and exquisite rhythm that set its author high among writers of prose, was followed in 1851 by *The House of the Seven Gables*, a story of the decay of a family doomed to bear an hereditary curse.

In 1852 Hawthorne brought out *The Blithedale Romance*, a satire on those reformers who, lacking human nature themselves, think they can improve their fellows out of it. In 1860 appeared his fourth

and last romance, *Transformation*, or *The Marble Faun*. He died at Plymouth, New Hampshire, May 19, 1864. He had held appointments under the American Government at Boston, Salem, and at Liverpool, England. *See Concord*; *Emerson*; *consult also Works*, ed. G. P. Lathrop, 13 vols., 1893-94; *Life*, J. Hawthorne, 1885; *Memoirs of H.*, R. H. Lathrop, 1897; *H. the Artist*, L. Schubert, 1944; *The Hawthornes*, V. Loggins, 1951.

Hawtrey, SIR CHARLES (1858-1923). British actor. Born Sept. 21, 1858, he was educated at Eton and Rugby. He made his first stage appearance in 1881 at the Prince of Wales's Theatre, under the name of Bankes. In 1884 he played Douglas Cattermole in *The Private Secretary*, which achieved an extraordinary success and ran until 1886. In 1885 he became manager of Her Majesty's and in 1887 he took over the management of the Comedy.

In 1901 he went to New York and appeared in *A Message from Mars*, which he brought to London in 1905. He produced many successful plays, *Ambrose Applejohn's Adventure*, 1921, being one of the most liked, and acquired great popularity. Knighted in 1922, he died July 30, 1923. His reminiscences, *The Truth at Last*, ed. Somerset Maugham, were published posthumously.



Sir Charles Hawtrey, British actor
Foulsham & Banfield



Hawthorne. The Old Manse, Concord, Mass., where Nathaniel Hawthorne wrote *Mosses from an Old Manse*

Hawtrey, EDWARD CRAVEN (1789-1862). Headmaster of Eton. Born at Burnham, Bucks, May 7, 1789, his father was a clergyman. He was educated at Eton and King's College, Cambridge, and after taking his degree became an

assistant master at Eton, Keats then being the head. In 1834 Hawtrey succeeded him, becoming one



Edward C. Hawtrey,
Headmaster of Eton

of the greatest headmasters the school has ever had. He introduced a number of needed reforms; and buildings were enlarged, and the chapel was restored. In 1852 he resigned and was chosen provost of Eton. He became vicar of Mapledurham, and died Jan. 27, 1862.

Hay and Haymaking. Hay is the fodder produced by drying naturally grass, clover, and other herbage plants. The grass used for this purpose may be derived from permanent grassland or from "seeds," that is, grasses, clovers, and other plants sown as a crop in the ordinary rotation of crops. The average chemical composition of grass, and of hay made therefrom, varies considerably, but average figures, expressed as percentages, are—Grass: water, 80.0; protein, 3.5; ether extract, 0.8; carbohydrates, 9.7; fibre, 4.0; ash, 2.0. Meadow hay: water, 14.3; protein, 9.7; ether extract, 2.5; carbohydrates, 41.0; fibre, 26.3; ash, 6.2. "Seeds" hay: water, 14.0; protein, 12.0; ether extract, 2.8; carbohydrates, 37.4; fibre, 27.5; ash, 6.3. The differences between these figures—showing for hay as compared with grass a decrease in water, and a corresponding increase in the main feeding constituents—reflect the aim of making hay which is to secure such a desiccation of the succulent green material as will permit of its preservation in stack in a sound, sweet condition. Drying is by the sun and wind, and the essence of good haymaking is to get the hay dried without the leaching of the valuable feeding constituents by rain, and with as little loss as possible of the leaves, the most valuable portion of the plants nutritionally.

Hay is the most palatable bulky food produced on the farm, and at the same time one of the least expensive to grow and secure, granted reasonable weather during making. Its feeding value depends primarily on the nature of the herbage of which it is composed, leguminous plants having a higher feeding value than most of the grasses included in grass seed mixtures or found in permanent

meadows. The age and hence the stage of development of the plant at the time of cutting also affect the quality of the resulting hay. Once the seeds of the constituent plants have begun to form there is a gradual withdrawal of material from the leaves and stems, and a distinct increase of fibre, a substance of little use as food, in these parts of the plant. The producer's aim is, therefore, to cut the crop as soon as possible after flowering. If for any reason the constituent seeds, particularly of grasses, have filled too far, there is danger of their being shaken out and lost in the handling subsequent to cutting. Finally, the extent to which hay is thoroughly cured regulates the amount of heating and of moulding in the stack; over-heating reduces the digestibility, moulding affects the palatability of the hay.

Gathering the Crop

The hay crop is usually cut with a horse-drawn or tractor-driven mower, and left in swaths to dry for periods that depend on the rate of drying. As they dry, the swaths are commonly turned by one of many forms of turners, and then either gathered into windrows and collected and stacked from carts provided with loaders or made up into cocks for further drying. In districts where the weather usually precludes rapid curing the cocks are built fairly large, and may be left out for several weeks before they are removed for stacking. Baling is sometimes done directly from the field immediately the hay is sufficiently dry; it obviates stacking and much subsequent handling, and makes the hay much easier to transport.

In wet districts hay is often dried in the long state by some form of grain drier. This does away with much of the unprofitable labour involved in getting hay into condition before stacking, and, indeed, often prevents total loss of the crop. The dried hay is baled, which preserves its good condition, particularly in districts where the air in winter months is heavily charged with moisture.

H. Hunter, D.Sc.

Hay. River of Canada, in the prov. of Alberta and the N.W. Territories. Rising on the frontier of British Columbia and Alberta, it flows N.E. and N. through Lake Hay, and discharges into the S. extremity of the Great Slave Lake. Of its two magnificent cataracts, the Alexandra falls over 250 ft. Its course is about 352 m.

Hay, IAN. Pen-name of the Scottish novelist John Hay Beith. See Beith, J. H.

Hay, JOHN (1838-1905). American statesman and author. Born at Salem, Ind., Oct. 8, 1838, he graduated at Brown university in 1858. He then became a law student in Abraham Lincoln's office at Springfield. When Lincoln became president he took Hay with him to Washington as assistant to his principal private secretary, John G. Nicolay, and employed him on various confidential missions during the Civil War. From 1865 to 1870 Hay held posts in the diplomatic service at Paris, Vienna, and Madrid successively. He spent the next five years as chief leader-writer on the New York Tribune. In 1887 McKinley appointed him ambassador to London, but recalled him in 1898 as secretary of state, in which capacity he served under T. Roosevelt also until his death. As foreign minister he was concerned with the Alaska boundary dispute, the Anglo-German blockade of Venezuela and the Hay-Pauncefote treaty, but his principal achievement was the securing of the "open door" in China. His literary reputation rests upon his monumental *Life of Lincoln* (in collaboration with Nicolay), 1889; *Castilian Days*, 1871; *Pike County Ballads*, 1871; *Poems*, 1890; and an anonymous novel, *The Broad Winners*, 1883. He died at his summer home at Newbury, N.H., on July 1, 1905. *Consult* Life, L. Sears, 1914.

Hay, WILLIAM THOMSON (1888-1949). British actor. Born in Scotland, Dec. 6, 1888, he became an engineer apprentice, but went on the stage as Will Hay at the age of 21. Will Hay's music hall sketches—especially as the schoolmaster of St. Michael's College—were equally successful over the radio and on the screen. His films included *Boys Will Be Boys*, 1935; *Oh! Mr. Porter*, 1938. Hay was also an enthusiastic amateur astronomer, discovering a spot on Saturn in 1933. He died April 18, 1949.

Hayashi, COUNT TADAKU (1850-1913). Japanese statesman. Born at Sakura, Jan. 22, 1850, he was



John Hay

educated in England and entered the Japanese foreign office, 1891. He was appointed minister to China, 1895, and from 1897-99 represented Japan in Russia. In 1900 he was made ambassador to London, where he negotiated treaties with Great Britain in 1902 and 1905. Returning to Japan as foreign minister, 1906-8, he held the portfolio of commerce from 1911 until his death, July 10, 1913.

A namesake, Baron Gonsuke Hayashi (b. 1860), was ambassador in London, 1920-25.

Hayashi, SENJURO (1876-1943). Japanese army officer. He entered the army in 1896 and saw active service in the Russo-Japanese war. In 1931, when friction over alleged frontier incidents developed between China and Japan, he was commander of the Japanese troops in Korea and without waiting for authority from Tokyo marched into Manchuria. Promoted general in 1932, he was appointed minister for war two years later, and in 1935 became a member of the supreme war council. Early in 1936 he resigned following the assassination of Viscount Saito and other prominent statesmen by a mutinous clique of junior army officers. He was premier Feb.-May, 1937. He retired from the army in 1939, and died at Tokyo, Feb. 4, 1943.

Hay-box Cookery. Method of fireless cooking which employs a wooden box, lined with paper and stuffed with hay, and having a tightly fitting lid. Food is brought to the boil on a stove and cooked there for a few minutes, then transferred at once to the hay-box. There cooking may continue slowly for several hours through the heat conserved by the hay. When required, the food is brought to the boil again on the stove.

The so-called hay-boxes, used by military rationing units to keep food hot while it is being conveyed from the field-kitchen to troops operating or manoeuvring in the open, are designed on the principle of the vacuum flask (*q.v.*).

Hay Diet. Dietetic system formulated by Dr. W. H. Hay (1867-1941), a New York physician. He advocated meals so

balanced that the consumption of starch and proteins at the same time is avoided. He claimed in his book, *Health via Food* (1934), that application of his diet at his own sanatorium resulted in the cure of asthma and diabetes, but his theories were not accepted by orthodox medical opinion.

Haydn, FRANZ JOSEPH (1732-1809). Austrian composer. The son of a wheelwright, he was born at Rohrau, near Vienna, March 31, 1732. He became a chorister in St. Stephen's Cathedral, Vienna, where he obtained his early musical training, and after leaving there gained

a precarious living by teaching. He managed, however, to devote much time to study and composition, and in order to persuade Porpora (*q.v.*), the great teacher of singing, to give him the benefit of his instruction, he entered his service as accompanist and valet.

Haydn's compositions and his connexion with Porpora having brought him into notice, he was appointed in 1759

director of the private band of Count Morzin, and shortly afterwards composed his first orchestral symphony. In 1761 he entered the service of Prince Anton Esterhazy, and on his death continued with his brother Nicholas. Eventually he became director of the music of the prince's private chapel, and had under his control an orchestra and a choir. This gave him unrivalled opportunities for studying the possibilities of the orchestra.

On the death of Prince Esterhazy in 1790 Haydn was persuaded to visit England, and the success of this visit induced him to pay a second in 1794. During these visits he composed some of his finest symphonies. His oratorio, *The Creation*, was produced at Vienna in 1798, and *The Seasons* in 1801. Haydn's importance in the history of music is due to the character of his numerous instrumental works. The best of these are more mature in style and show more skill in the treatment of the orchestra than earlier works.

The total volume of Haydn's work is very great; there are about

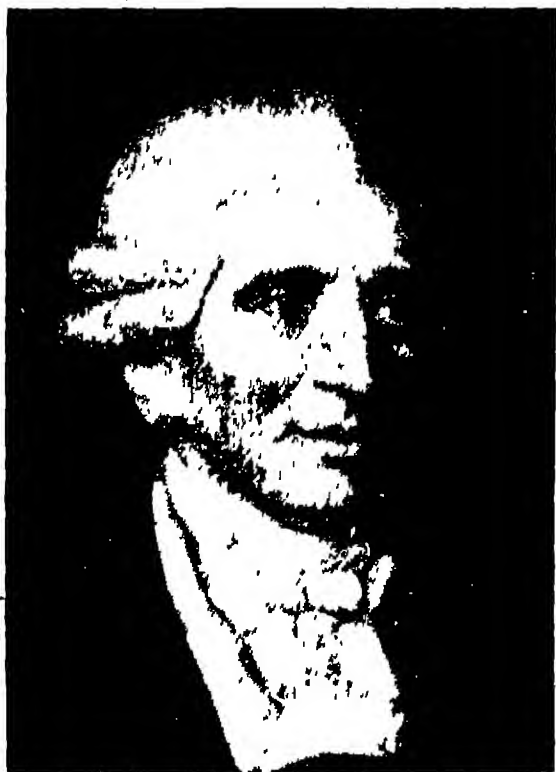
150 symphonies, 77 quartets, and some 40 trios, with a large body of religious music and songs. But he was not, according to his own account, a quick worker, and yet scarcely ever is the freshness and clarity of his inspiration affected by his deliberate methods of work. The famous national anthem of Austria, the so-called Emperor's Hymn, also familiar as a hymn-tune and as the tune of *Deutschland, Deutschland über Alles*, was composed in Vienna in 1797. He died in Vienna, May 31, 1809. *Consult* Joseph Haydn in London, von Karajan, 1861; A Croatian Composer, W. H. Hadow, 1897; biographies by M. Brenet, Eng. trans., 1926; C. F. Pohl, completed 1927; J. C. Hadden, new ed. 1934; R. Hughes, 1950.

Haydock. Urban dist. of Lancashire. It is 3 m. S.E. of St. Helens, having its own railway station. The chief industries are coal mining and ironfounding. Race meetings are held in Haydock Park. Pop. (1951) 11,838.

Haydon, BENJAMIN ROBERT (1786-1846). British painter and author. Born at Plymouth, Jan. 26, 1786, he studied at the R.A. schools and won prizes with his *Death of Dentatus*, 1809, and *Judgement of Solomon*, 1814, but jeopardised his prospects by quarrelling with the Academy. After a stormy career, during which, though he was paid hundreds of guineas for some of his paintings, he was twice imprisoned for debt, he was ignored in the Westminster Hall competition of 1843—his own idea—and failed with an exhibition

of his own works at the Egyptian Hall in 1846. Barnum's Tom Thumb next door drawing crowds. This disappointment drove him to suicide in his studio, June 22, 1846.

Haydon's work as an historical painter was far above the level of his time, although somewhat hard and repellent. One may cite his *Christ's Entry into Jerusalem*, 1820; *Wellington at Waterloo*, 1839; *Banishment of Aristides*, 1846; *Nero playing during the burning of Rome*, 1846. He left an autobiography, pub. 1847; and wrote *Lectures on Painting and Design*, 1844, and other books on art. *Consult* *Life and Death of B. R. H.*, E. George, 1948.



Fr. Haydn



B. R. Haydon
After G. M. Zornlin

Hayes. Parish and village of Kent, England. It is situated on the slope of a hill and the edge of a common, 15 m. S.E. of Charing Cross, between West Wickham and Woodside, with a rly. station. Hayes Place, pulled down in 1928, was the favourite residence of the 1st earl of Chatham, who died there, and the birthplace of his son, William Pitt. General Wolfe dined there on the eve of his departure for Quebec. The Early English church of S. Mary, built on the site of a Roman structure, and containing brasses, monuments of interest, and a memorial to Chatham erected 1928, was restored in 1861-62. Hayes Common, a breezy stretch of uplands, 220 acres in extent, covered with heather, bracken, bramble, and hawthorn, commanding picturesque views, and a favourite resort of cyclists, was secured to the public in 1869. Henry Hallam died in Hayes parish. Pop. 1,678. See Keston.

Hayes, CATHERINE (1690-1726). English murderess. Born near Birmingham, she married John Hayes, a carpenter, and lived with him in Tyburn Road, now Oxford Street, London. On March 1, 1726, with the aid of two lodgers, Wood and Billings, she murdered her husband, whose head was thrown into the Thames at Westminster, and whose body, cut into pieces, was secreted in Marylebone Fields. The head being found and identified, Hayes was sentenced to be burnt alive, and her two accomplices to be hanged. Wood died in Newgate; Billings was hanged in chains. Hayes, who tried to poison herself, was executed at Tyburn, May 9, 1726. Thackeray based his story, *Catherine*, 1839-40, upon her career.

Hayes, RUTHERFORD BIRCHARD (1822-93). President of U.S.A. Born in Delaware, Ohio, Oct. 4,

1822, he was educated at Kenyon College and studied law at Harvard, being admitted to the bar in 1845. Having built up a successful practice in Cincinnati, he joined the Union

army and served with distinction throughout the Civil War. Member of congress, 1865-67, and governor of Ohio, 1868-72 and 1876-77, he stood for the presidency in 1876 on the Republican ticket, and

was finally declared elected by one electoral vote. He did much to improve the financial position of the country and pursued a conciliatory policy towards the southern states. After his term he retired from public life and died at Fremont, Ohio, Jan. 17, 1893. *Consult* Life, W. D. Howells, 1876; *Diary and Letters*, ed. P. Haworth, 1922.

Hayes and Harlington. Urban dist. in the county of Middlesex, England. It is 11 m. by railway W. of Paddington, on two main London roads—the Uxbridge road and the Bath road—and on the Grand Union canal. Part of London airport is in the S. of the dist., which forms a bor. constituency, and has many and varied light industries, including printing, making radio and television instruments, gramophones, gramophone records, car accessories, aeroplanes, food products, furniture, electrical and rubber products, building materials, trailer caravans.

The manor of Hayes, before the time of Henry VIII, belonged to the see of Canterbury. The parish church of S. Mary, restored 1873-74, has a 13th century tower, a 16th century wooden roof to the nave, and an unusual lych gate. Harlington is mentioned in Domesday as a manor of ten hides. The parish church of SS. Peter and Paul comprises all styles of architecture, beginning with Norman. The parish of Cranford, referred to in Domesday as Cranforde, also has an ancient church (S. Dunstan) of great interest, and has claims to historic distinction based on its situation on the great Bath road of coaching days. Pop. (1951) 65,590.

Hay-fever. Catarrhal affection of the mucous membrane of the eyes, nose, mouth, and air-passages due to irritation by the pollen of various grasses and plants in the presence of allergy. The disease is common all over Europe and N. America, and chiefly occurs during the hay season. The symptoms are those of a heavy cold with much sneezing and headache. Asthmatical attacks are not uncommon. Sufferers from hay-fever should avoid agricultural districts during the summer months. Mountainous regions or the seaside are the best places for them to live. The bedroom windows should generally be closed at night. Local protective applications and decongesting sprays sometimes give relief. "Pollantin," an anti-toxic serum, has proved efficacious. Septic foci in teeth, tonsils, and sinuses must be removed; herein lies the essential treatment.

Hayling. Island of Hampshire, England. It lies between the harbours and Langstone and Chichester, a short distance from the mainland, and has a railway station. Extending about 4 m. from N. to S., its area is 10 sq. m.; it is popular as a seaside resort. There are golf links and other attractions. The village of S. Hayling has a fine old church dedicated to S. Mary. The island was long the property of the Benedictines. The Fleet Air Arm had an aerodrome here during the Second Great War.

Haymarket. London one-way street for S-bound traffic extending from the E. end of Piccadilly to Pall Mall, S.W. The name derives from the market for hay and straw held there until removed to Cumberland Market, Regent's Park, in 1830. The Carlton Hotel and Her Majesty's Theatre, on the W. side, cover the site of the King's Theatre or Italian Opera House, later Her Majesty's Theatre, demolished in 1893. On the same side are the Carlton and Gaumont cinemas. On the E. side is the Haymarket Theatre, just N. of which is Panton Street containing the Comedy Theatre.

Thynne of Longleat was murdered in this street by assassins hired by Count Königsmarck, 1682. Dr. Johnson's friend, Barretti, mortally wounded a man who attacked him here in 1769, and after being tried for murder was acquitted. Addison lodged for a time in this street, with which are also associated the names of George Morland, Sir Samuel Garth, and Mrs. Oldfield.

Haymarket Theatre. London theatre. The original Haymarket Theatre, in which Fielding produced *Tom Thumb the Great*, and of which he became manager in 1734, was opened Dec. 20, 1720, with a French comedy, *La Fille à la Mode*. Later famous managers were Charles Macklin, Samuel Foote, 1747-87, and the two Colmans. Bannister, Elliston, and Liston all made their first appearance in the Little Theatre, as it was called, and here John Poodle's Paul Pry was first performed. The second Haymarket Theatre, which stands on a site immediately adjoining that of the first, was opened July 4, 1821.

At the close of Buckstone's management in 1879, it passed into the hands of the Bancrofts, who reconstructed it, abolishing the pit and adding the pit area to the stalls. Under their management, 1880-85, it enjoyed great popularity, which continued undiminished.



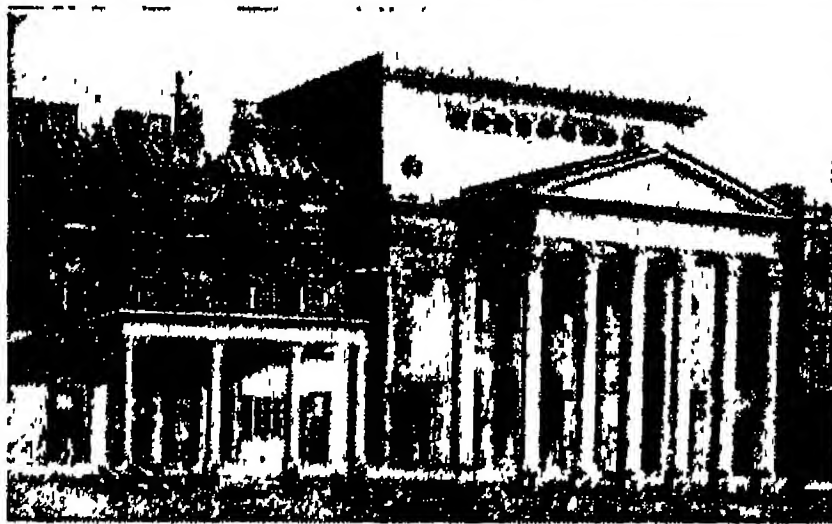
R.B. Hayes

ished under Tree, 1887-95, and from 1896 to 1905 under the joint management of Cyril Maude and Frederick Harrison. In 1904 the interior was rebuilt, the pit being restored. Extensive alterations were made in 1934. Later successes included *Mary Rose*, 1920; *The Dover Road*, 1922; *The Man with a Load of Mischief*, 1925; *The Moon in the Yellow River*, 1934; *The Amazing Dr. Clitterhouse*, 1936. In 1943-46 John Gielgud played therein several notable revivals, among them *Love for Love* and *Lady Windermere's Fan*. Consult *The Haymarket Theatre*, C. Maude, 1903.

Haynau, Julius Jakob, Baron von (1786-1853). Austrian soldier. A natural son of the elector of Hesse, William IX, he was born at Kassel, Oct. 14, 1786. Having entered the Austrian army, he saw service in the Napoleonic Wars. In the Italian campaigns of 1848-49, in which he held a high command, he became notorious for his flogging of women at the taking of Brescia, and for other atrocities. In the Hungarian insurrection of the same period he was in command of the Austrian forces, and his conduct of the campaign, in which he admittedly showed great military talents, was again marred by ruthless ferocity. He decisively defeated the Hungarians near Temesvar. In 1850 he came to London, but his reputation had preceded him, and he was badly mauled by the draymen of Barclay and Perkins's brewery. He died at Vienna, March 14, 1853.

Hay-Pauncefote Treaty. Agreement concluded in 1901 between John Hay, U.S. secretary of state, and Lord Pauncefote, British ambassador at Washington. The treaty was negotiated to replace the Clayton-Bulwer Treaty of 1850 (*q.v.*). Its substance was that Britain conceded to the U.S.A. the sole right to construct, maintain, and police the Panama canal, while the U.S.A. agreed that the canal should be open to the ships of all nations on equal terms.

In 1911, Congress passed the Panama Canal Act, exempting American ships engaged in coastwise trade from canal dues. This move was defended on the ground that the clause providing for equality of treatment of the ships of all nations referred only to foreign nations. An Act of 1914 repealed this exemption.



Haymarket Theatre. Showing the new theatre, opened 1821, replacing the old theatre (left)
From an old print

Hays Office. Popular name for the motion picture producers' and distributors' association set up in the U.S.A. in 1922 under the presidency of Will H. Hays (1874-1954), who resigned the postmaster-generalship to take up the post, to organize the voluntary censorship of films. In 1934 it drew up a production code, the general principles of which were (1) no picture shall be produced which will lower the moral standards of those who see it; the sympathy of the audience shall never be drawn to the admiration of crime, wrong-doing, evil, or sin; (2) correct standards of life, subject only to the requirements of drama and entertainment, shall be presented; (3) law, natural or human, shall not be ridiculed, nor shall sympathy be created for its violation. All large producers in the United States voluntarily accept the rulings of the association. Hays was succeeded in the presidency in 1945 by Eric Johnston, formerly president of the U.S. chamber of commerce. See *Censorship; Film Censors*, British Board of.

Hayter, Sir George (1792-1871). British artist. Born in London, Dec. 17, 1792, he studied at the R.A. schools. After a brief period at sea and three years' study in Rome he settled down in London to portrait and miniature painting. His reputation was already established when he was appointed portrait and historical painter to Victoria on her accession, 1837, and in 1838 he exhibited at the R.A., *The Queen seated on the Throne in the House of Lords*, now in the Guildhall, London. His picture of the Coronation and the Marriage are now in the royal collection at Windsor. He

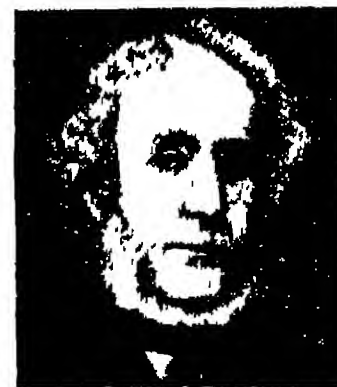


Sir George Hayter, British artist
Self-portrait

was appointed principal painter to the queen 1841, knighted 1842. He died Jan. 18, 1871.

Hayti. See *Haiti*.

Hayward, Abraham (1801-84). British essayist. Born at Wilton, Wiltshire, Nov. 22, 1801, and educated at Blundell's School, Tiverton, he was called to the bar, but never had more than a moderate practice, although he founded, and for many years edited, *The Law Magazine*, and was made Q.C. in 1845. He was an assiduous contributor to the periodical press, on politics, social and other topics, and an authority on gastronomy. His *Art of Dining* enjoyed great



Abraham Hayward, British essayist

vogue; also his own dinners at the Temple, where he entertained notable people. He edited *Mrs. Piozzi's Autobiography*, 1861, and *Diaries of a Lady of Quality*, 1864. He died in London, Feb. 2, 1884.

Hayward, Tom (1871-1939). English cricketer. Born at Cambridge, March 29, 1871, he first played cricket for Surrey in 1893, and for twenty years was one of the mainstays of the county team. His best season was 1906, when he scored 3,518 runs, an English record for one season which stood for 41 years. His highest innings was 315 not out against Lancashire at the Oval in 1898. In 1900 he had scored over 1,000 runs by the end of May. Three times he made a century in each innings of a single match, four of these centuries being obtained in one week, a record in first-class cricket. Altogether he scored 104 centuries. Hayward played several times in test matches against Australia. He died July 19, 1939.



Tom Hayward, English cricketer

Hayward's Heath. Former urban dist. and market town of Sussex, England. It is now part of the urban dist. of Cuckfield (*q.v.*).

Hazara. Dist. of the Peshawar division of W. Pakistan, in what was formerly the N.W. Frontier prov. Area 3,000 sq. m. The country was at one time under Sikh rule, but during the Sikh wars the Hazaras rebelled against their governors, and after the British annexation of the Punjab they were put definitely under British administration and not linked with Kashmir, to which state Hazara had previously been joined. The dist. consists of a wedge of land running far into the outer Himalayas, and watered by tributaries of the Indus.

The Hazara tribes live in the Black mt. They are Mongoloid in origin and are mostly Issazai Pathans and are allied in blood to the Pathans of Swat on the other side of the Indus. They claim descent from the followers of Jenghiz Khan. They are poor and fanatical and very much in the hands of their mullahs. From time to time they have raided the settled districts, e.g. in 1890, 1895, 1905, 1920, 1946, but they were usually dealt with by the Gurkhas stationed in Abbottabad, the hill station named after James Abbott, the first commissioner in charge of Hazara. Their fastnesses are very difficult to penetrate; but their poverty makes them susceptible to blockade. In their territory live a number of Sikh and Hindu craftsmen and traders.

The forests of the Black mt. produce a considerable amount of timber. Maize, wheat, and barley are the chief crops. Mineral resources include coal, limestone, building stone, gypsum, and iron. Pop. (est.) 800,000.

Hazard. Old game of chance, played with two dice by any number of persons. The basis of the game is the "main," or first throw, which determines the value of a subsequent throw and the amount required to win. The lowest score is two aces, termed crabs. Hence the alternative name for the game, crabs or craps.

Hazard is also the name of a card game for four players in partnerships of two. It is played with 25 cards, consisting of all cards above the denomination of 9, together with the joker. Six cards each are dealt, and the players bid and play as in nap (q.v.), the lead and the choice of trumps going to the highest bidder. Jacks are given special importance in trumping.

In tennis (i.e. real tennis), all that part of the court on the opposite side of the net to the

service or dedans side is known as the hazard side (see Tennis). In golf, hazards are patches of rough or difficult ground, both natural and artificially constructed; and there are also water hazards. In billiards, the pocketing or "potting" of a ball other than the striker's, after contact with another ball, is called a winning hazard; a losing hazard occurs when the striker's own ball goes into a pocket after contact with another ball.

Hazaribagh. District and town of Bihar, India, in Chota Nagpur Division. It has an area of 7,021 sq. m., of which about one-third is under cultivation, rice being the chief crop. Hazaribagh is the centre of a considerable coal industry, Giridih being one of the most important coalfields in the country, while the Bokaro-Ramgarh field promises to be of great importance. Exports include coal and coke, while food grains and cotton piece-goods are imported. Hazaribagh town is of little commercial importance. Pop. (1951) dist., 1,937,210; town, 33,812.

Haze. Condition of low visibility, most frequently due to dust or smoke. The term is applied meteorologically when the foreign solid matter present reduces the visibility so that, under normal illumination, objects 1 km. distant can be discerned while those at 2 km. cannot. If the visibility is below 1 km. a smoke fog or dust fog is said to occur. Haze is commonly experienced over most of the land surfaces of low elevation, but is rarely observed over the ocean and on high mountains, as in these regions the air is free from dust. Fine particles of dust carried from desert areas by the wind, and the smoke from forest fires or burning peat bogs, as well as that due to factories, etc., often cause a haze which extends over hundreds of square miles. Haze is most commonly experienced during spells of dry weather, because rain washes dust from the air. Haze due to these causes must not be confused with the haze due to a damp atmosphere which is, in reality, an incipient fog. See Atmosphere; Fog.

Hazebrouck. Town of Franco, capital of an arrondissement, in

the dept. of Nord. An important rly. junction, it lies on the canalised river Bourre, 32 m. W.N.W. of Lille. Among its industries are tanning and flax spinning, and the manufacture of oil and soap. It was an important strategic centre and railroad in the First Great War, and was frequently shelled by German long-range guns. It was seriously threatened during the enemy offensive in April, 1918, and the civilian population was evacuated. In the Second Great War the town formed part of Lord Gort's line of communications in May, 1940, and when the B.E.F. retired upon the coast it was captured by the Germans, becoming one of their main bases. Later the town's marshalling yards were repeatedly attacked by the R.A.F. in their offensive sweeps over N. France. Hazebrouck was liberated by the British 2nd army at the beginning of Sept., 1944. Pop. (1954) 15,525.

Hazel (*Corylus avellana*). Large shrub of the family Fagaceae. It is a native of Europe, N. Africa, and temperate Asia. The leaves are alternate in two rows, roundish, with an unequal heart-shaped base, doubly toothed. The male flowers, long, pendulous catkins, form in Sept., and mature in Feb.; the female flowers resemble leaf-buds, with the crimson thread-like styles protruding. The fruit is a sweet, oily nut, enclosed in a woody shell, and this in a large, leathery cupule.



Hazel. Leaves, nuts, catkins, and female flower

Filberts, cob-nuts, Barcelona, and Spanish nuts are all varieties of this species. See Bud illow.

Hazleton. City of Pennsylvania, U.S.A., in Luzerne co. Situated 1,800 ft. high on a plateau of a spur of the Blue mts., 28 m. S.S.W. of Wilkes-Barre. It is served by the Pennsylvania, the Lehigh Valley, and other rlys. Centre of one of the most valuable anthracite regions in the U.S.A., the veins having been uncovered by a deer's paw, according to local legend. Hazleton is a manufacturing and trading centre for the surrounding mining region. Manufactures include mining machinery, iron, sheet steel, centrifugal pumps, clothing, and silk and knitted goods. The many domes of Greek Orthodox churches in which a

part of the pop. of E. European extraction worships are a distinctive feature of the city. It was settled in 1820, incorporated as a borough in 1856, and chartered as a city in 1892. Pop. (1950) 35,491.

Hazlitt, WILLIAM (1778–1830). British essayist and critic. Son of William Hazlitt (1737–1820), a Unitarian minister, of Irish descent, he was born in Mitre Lane, Maidstone, Kent, April 10, 1778. He was in Boston, U.S.A., with his parents, 1783–86. In 1787–93 he was living with them at Wem, Shropshire. A student in Hackney Theological College, 1793–94, he abandoned the idea of a ministerial career in 1797, met Coleridge at Wem, Jan., 1798, and on visiting him at Stowey in the following spring was introduced to Wordsworth. He studied art 1798–1805 (in Paris in 1802), painted portraits of Hartley Coleridge, Wordsworth, and Charles Lamb, and displayed a bent towards the study of metaphysics.

His earlier work included an *Essay on the Principles of Human Action*, being an argument in favour of the natural disinterestedness of the Human Mind, 1805, the outcome of an inquiry in which he was encouraged by Coleridge; *Free Thoughts on Public Affairs*, 1806; an abridgment of Abraham Tucker's *Light of Nature*, 1807; and *Eloquence of the British Senate*, a selection of parliamentary speeches with notes, 1807. On May 1, 1808, at St. Andrew's, Holborn, he married Sarah Stoddart, and settled at Winterslow, near Salisbury, Wilts, which gave its name to a volume of his essays issued in 1839.

Coming to London, 1812, he lectured at the Russell Institution on *The Rise and Progress of Modern Philosophy*. He was parliamentary reporter and dramatic critic of *The Morning Chronicle*, 1812–14, and began to contribute to *The Champion*, *The Examiner*, and *The Edinburgh Review* in 1814. He published *The Round Table* essays and *Characters of Shakespeare's Plays*, 1817; *A View of the English Stage*, 1818; *Lectures on the English Poets*, 1818; on the *English Comic Writers*, 1819; and on the *Dramatic Literature of the Age of Elizabeth* (delivered at the Surrey Institution), 1820. He joined the staff of *The London Magazine*, his essays in which appeared in *Table Talk*, 2 vols., 1821–22.

The years 1822–23 were notable for his visit to Scotland to secure a divorce; his temporary if passionate attachment to Sarah Walker, one of the two daughters of a Mr. Walker, in whose house at 9, Southampton Buildings, Chancery Lane,

he took lodgings in 1820, which inspired his morbidly egotistical *Liber Amoris*, or the *New Pygmalion*, 1823, new ed. by R. Le Gallienne, 1894; and the issue of *Characteristics in the manner of Rochefoucauld's Maxims*. In 1824 he married the widow of Col. Bridgewater, and travelled with her in France and Italy, but was left by her on the return journey.

A series of personal sketches of contemporaries, *The Spirit of the Age*, appeared in 1825; *Notes of a Journey through France and Italy*, and *The Plain Speaker*, *Opinions on Books, Men and Things*, 2 vols., in 1826; *Life of Napoleon Buonaparte*, 4 vols., 1828–30; *Conversations of James Northcote*, 1830 (new ed. 1949). Other works: *A Character of Mr. Burke*, 1807; *A New and Improved Grammar of*



W. Hazlitt

From a miniature by his brother John

the *English Tongue*, 1810; *Memoirs of the Late Thomas Holcroft*, 1816; and *Sketches of the Principal Picture Galleries of England*, 1824. Ill-health and monetary troubles darkened his later years, but his last words, uttered just before he died at his lodgings in Frith Street, London, Sept. 18, 1830, were, "Well, I've had a happy life." He was buried in the churchyard of St. Anne's, Soho. He left a son, William.

Hazlitt's life was rather sordid and stormy. His domestic relations were unhappy; at one period, when he was on *The Morning Chronicle*, he gave way to intemperance, facts of which those of his critics who were politically opposed to him took provocative advantage. He participated in the hopes which formed the legacy of the last decade of the 18th century; when those hopes were shattered, the reaction made him a bitter critic of humanity. Politically he was a democrat; he adhered to certain dog-

mas imbibed in his youth, but kept his often violent political prejudices apart from his literary estimates. He is in the first rank of English literary critics; his literary judgements, generally, are the judgements of posterity. His style, which varies in harmony with his subject, is wholly admirable.

W. F. Aitken

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Hazlitt, WILLIAM CAREW (1834–1913). British author. Born in London, Aug. 23, 1834, he was a grandson of the essayist (v.s.). Educated at Merchant Taylors' School, William Carew Hazlitt was called to the bar, 1861, and for a time studied civil engineering, but he devoted most of his life to literary and antiquarian pursuits. He died Sept. 8, 1913. He edited *Shakespeare Jest Books*, 1864; *Brand's Popular Antiquities*, 1870; *Warton's History of English Poetry*, 1871; *Dodsley's Old Plays*, 1874–76; *Shakespeare Library*, 1875; *Letters of Charles Lamb*, 1886; *Cotton's translation of Montaigne's Essays*, 1902; compiled *English Proverbs and Proverbial Phrases*, 3rd ed. 1906; and was the author of *Memoirs of William Hazlitt*, 1867; *Studies in Jocular Literature*, 1890; *Lamb and Hazlitt*, 1900; and other works.

Hazor. City of ancient Palestine, in the territory of the tribe of Naphthali; on its site is modern Tell el Kedah, 5 m. S.W. of L. Hule, in Israel. Mentioned in the Mari letters and Egyptian texts of the early 2nd millennium B.C., it was strongly fortified in the Hyksos period and seems to have been the most important city in the Galilee district. Thothmes III captured it and its king Abdi-Tarshi appears among Egypt's vassals in the Tell el-Amarna letters. Joshua took and destroyed it (Josh. 11, v. 10) and it was rebuilt and fortified by Solomon as one of his royal cities. In the days of Pekah, king of Israel, in 732 B.C., Tiglath-Pileser III of Assyria destroyed the city (2 Kings 15).

Excavations carried out by the Hebrew University of Jerusalem in 1955 confirmed the size and importance of Hazor; its population is estimated at 40,000. Canaanite temples with statues and cult-objects, and other buildings and water installations, are dated to the Bronze Age; the date of Joshua's destruction appears, on

pottery evidence, to have been in the 13th century B.C.

A kingdom of Hazor in Arabia, otherwise unknown, is mentioned as the home of settled Arabs in Jeremiah 49, vv. 28-33.

Head. Part of the body of an animal which contains the brain and organs of special sense. The head is divided by anatomists into the face and the cranium, which contains the brain and is covered by the scalp.

The word is used for the chief person in a society or enterprise; the chief boy in a school or form, or the headmaster; and for the top or end of anything, examples being the head of a nail, the head on a pot of beer, a head of water, the head of a river. The head is that side of a coin which bears the figure of a head. The word is used of a group of individuals in the phrase 5,000 head of cattle.

Head, SIR FRANCIS BOND (1793-1875). British administrator. Born at Hermitage, near Rochester, Jan.



Sir Francis Head,
British administrator
After N. Cook

1, 1793, and educated there and at Woolwich, he was gazetted into the Royal Engineers in 1811. Serving in the Mediterranean and through the Waterloo campaign, he retired from the army in 1825, and on his return from a brief visit to S. America wrote his *Rough Notes of a Journey in the Pampas and Andes*, 1826. In 1835 he was appointed lieutenant-governor of Upper Canada, where his administration proved a conspicuous success. He resigned in 1837 and spent the rest of his life in England, where he became a regular contributor to *The Quarterly Review*. He was created a baronet in 1838. He died at Croydon, July 20, 1875.

Headache. Pain in the head. It is a symptom of a large number of pathological conditions.

Arterio-sclerosis, thickening of the coats of the arteries, is most frequently found in men of middle age and later, and is associated with gouty tendencies, Bright's disease, affections of the heart, and other disorders. Treatment of headache due to this disorder is to relieve the underlying condition. In chronic dyspepsia the headache is associated with furred tongue, offensiveness of the breath, constipation, and discomfort after meals. In young girls the condi-

tion is often associated with simple anaemia. Headache is also common in many forms of nervous breakdown, such as neurasthenia and anxiety neurosis. The headaches abate as the general condition improves.

Pain at the back of the neck may be due to eye strain, or to infection of the wisdom teeth and of the sinuses.

Migraine describes a severe pain in the head, always unilateral, always accompanied by nausea and sometimes by vomiting. An attack is ushered in by a disturbance of some sensory tract by sound, light, taste, or smell. (It has been suggested that Moses with his burning bush and Joan of Arc with her voices were both sufferers from migraine of which these were the visual and auditory signs.) Migraine is severe and prostrating. If untreated in highly strung and intelligent subjects, it tends to be an escape from the strains and distresses of life and to become incurable. Migraine is associated with infection of the sin-

uses or with a mechanical abnormality of the upper air passages, relief of which conditions should be sought, and with abnormal liver function, so that subjects are advised to avoid pork, milk, eggs, chocolate, and all fats except butter.

Headaches also occur from toxæmia in fevers, such as typhoid, malaria, influenza, tumours and diseases of the brain, injuries to the head, and affections of the ears and nose.

A simple headache, the result of fatigue or overwork, can usually be relieved by a moderate dose of aspirin, after taking which the patient should lie down for a couple of hours. Frequently recurring headaches indicate some constitutional cause which should be found and, if possible, remedied.

Head Deformation. Artificial modification of the form of the human skull. Widespread in primitive society, the custom is usually acted on within the first year of life. There are two major types: forehead, or occipital, flattening by head-boards, to emphasise the broad-headed skull; and sugar-loaf elongation by tight bandages, to emphasise the long-headed skull. Of these types, trace-

able among the early ancestors of the Armenians and Kurds respectively, sugar-loaf elongation was characteristic of the ancient Crimean peoples whom Hippocrates called long-headed. These forms of head deformation, still prac-



Head-Deformation. Board and bandage for moulding the shape of an infant's head, Borneo. Above, deformed head of a Negro baby of the Algerian interior
Ethnographical Collection, British Museum

tised by Borneo Klemantans or land Dyaks and some Melanesians, were carried across the Pacific to America. There they occurred among the ancient Maya, Aztec, and other peoples, their alien origin being confirmed by their absence from the Eskimo, Athapascan, and Algonquin regions. Forehead-flattening was observed by the Natchez and some N.W. Pacific tribes such as the Chinook; S. American Indians still practise conical deformation here and there. Cranial disfigurements are not transmitted, and do not appear to affect mental vigour, even though in more extreme forms of the practice there are few parts of the skull which do not become distorted to some extent.

Head-dress. Anything worn upon the hair or pate. Head ornament, amulet or decorative, was probably devised by prehistoric man before protective coverings. In an Upper Palaeolithic cave at Menton a male skull was found, adorned with stag's teeth, fish-bones, and pierced shells. On Spanish cave-portraits horns and feathers are shown. Fur caps may also have been used in that age; a Neolithic site in Denmark has yielded a woollen cap.

Primitive forms of head-dress, governed by the formation of the hair and climatic conditions, include dressed hair, decorated hair, head-bands, chaplets, brimless caps, brimmed hats, hoods, and veils. The hair may be dyed; stiffened with protective materials, such as S. African ochre and grease, Upper Congo soot and palm-oil, Latuka interwoven bark or twine; or shorn and replaced by a wig. Decoration is widespread; with teeth or bushy animal tails, as in Australia; flowers, as in Polynesia and Burma; and leaves or gems.

Head-bands of skin, bone, or fibre, used by the primitive Andamanese, Australians, Bushmen, and Fuegians, may be of ancient origin, and can be compared with the more sophisticated turbans and diadems. Sometimes used for the suspension of burdens, head-bands permit of the attachment of beads, cowries, rams' horns, wood shavings—as with the Ainu—and especially of feathers. These form the tribal or social badges of many peoples, such as the ancient Egyptian and modern Bari ostrich tips, Aztec trogon or quezal tails, Naga hornbill tail-feathers, Papuan paradise plumes, Maori huia feathers, and N. American Indian eagle bonnets. Chaplets of grass have been worn by Malacca Sakai, flowers by Polynesians, leaves in ancient Greece, jewels in E. Tibet.

High Crowns and Broad Brims

For skull-caps Hottentot women use fur, Nilotic peoples beads with cowry rims, Samoan chiefs' heirs fibre caps covered with women's hair. Tall hats, among the Kavirondo, sometimes reach 6 ft. Broad-brimmed hats especially characterise S.E. Asia. The Panama hat reached Central America through medieval Spain and Morocco from pre-Christian Egypt. Hoods are found among Eskimo and some Malay women; veils among most Muslim women and Tuareg men. From remote times head-dresses have been symbols of social or professional distinction, whether it be the helmets of warrior chiefs, the coronals of married women, or those affected by medicine-men, priests, headmen, or kings.

The head-dress of women has ranged through every degree of design from simple to absurdly elaborate. Among the wealthier Anglo-Saxons it consisted of a headrail or coverchief, often confined by a fillet of gold and enveloping head and shoulders and descending to the knees. In the 14th and 15th centuries the so-

called steeple or horned head-dress appeared; this assumed immense proportions, varying from 18 ins. to 3 ft. in height. It was introduced from France, where a similar style is still worn by some of the peasantry. In England this was succeeded by the hood, and by the bonnet of Elizabethan times.

The reign of William III was marked by the towering head-dresses, or fontange, worn by women. Towards 1800 enormously high hair-dressing became fashionable, and a curious hood, termed a calash, was introduced. This was made on the lines of the hood of a carriage, being supported by a framework of whalebone and pulled over the face by means of a string. *See Cap; Costume; Hat.*

Head-hunting. Custom among some primitive peoples of slaying strangers or enemies in order to utilise their heads as cult-objects or trophies. As developed out of human sacrifice by the Austric-speaking peoples of S.E. Asia and its archipelagos, its animistic purpose was partly spirit-worship, partly a productive rite. Until recent years it was practised mostly by ceremonial expeditions, in Austroasia (Naga, Wa); Indonesia (Dyak, Igorot, primitive Formosans); Melanesia (Solomon Islands); Polynesia (Maori). Sea Dyak and Formosans engrafted upon it the derivative purpose of qualifying for manhood and marriage. In Negro Africa—Nigeria, Togoland, Upper Congo—the custom presents local variations.

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Headingley. Residential suburb to the N.W. of Leeds, England. Here is a Methodist training college. The Leeds cricket club ground here on which the Yorkshire XI plays is also the scene of test matches. The ancient "shire oak," 29 ft. in girth, which long stood near the main road collapsed in 1941; a 10-year-old sapling was planted in its place in 1956.

Headlam, ARTHUR CAYLEY (1862–1947). British divine. Born at Whorlton, Barnard Castle, Durham, Aug. 2, 1862, the son of a clergyman, he was a scholar of Winchester and New College, Oxford, and a fellow of All Souls' College, Oxford, 1885–97 (and again from 1924). After holding lectureships in theology at Cambridge, he was rector of Welwyn,

Herts, from 1896 to 1903, when he became principal of King's College, London and prof. of dogmatic theology there. Professor of divinity at Oxford, 1918, he became C.H., 1921, and was appointed bishop of Gloucester, 1923, retiring in 1945. A forthright speaker and writer, Headlam edited the Church Quarterly Review, 1901–21; his writings include works on archaeology and on theology, and more popular books such as *The Life and Teaching of Jesus Christ*, 1923; *Economics and Christianity*, 1926; *What It Means to be a Christian*, 1933; the Holy Catholic Church, 1945. He died Jan. 17, 1947.

Headmaster. Name given in Great Britain and elsewhere to the principal of a public or other school for boys, although a special name, *e.g.* rector, is used in certain schools. In addition to the Headmasters' Conference (*v.i.*) there is in Great Britain the incorporated association of headmasters. Established in 1890, and incorporated in 1895, this consists of many headmasters of public secondary schools in Great Britain. The offices are 29, Gordon Square, London, W.C. Here are also the offices of the Association of Head Mistresses.

Headmasters' Conference. An association of headmasters of public schools in Great Britain. Edward Thring, headmaster of Uppingham, inaugurated it in 1869 by calling a meeting of headmasters at his house to form "a school society and annual conference." Since then meetings have been held, generally every year, in Jan., and matters of interest to educationists discussed. The number of schools represented at the conference is limited to 200. It was incorporated in 1909, and the offices are at 29, Gordon Square, London. *See Public School.*

Head Noises OR TINNITUS. Sounds, which have no objective existence, registered by the hearing centre in the human brain. They take the form of whistling, singing, ringing, or bubbling. They may be due to some disease of the hearing apparatus; to prolonged use of such drugs as aspirin or quinine; to working amid constant noise, as with electric drills; or to hardening of the cerebral arteries. Hallucinations of sound, "hearing noises," are connected with some forms of mental disorder. The causes should be sought and combated.

Headquarters. Centre of an organization whence instructions are supplied to subordinates, and the

entire enterprise controlled. In military organization, most units have their headquarters (commonly abbreviated to H.Q.), which receive instructions from a higher H.Q. In both Great Wars the chain of communication descending from general headquarters (G.H.Q.) was to army, corps, division, brigade, regiment, or battalion, and battery, company, or squadron headquarters. Each H.Q. must be in a sufficiently central position behind its line to control the whole front for which it is responsible.

In a commercial undertaking, headquarters is sometimes applied to the central offices of the board of management, whence the business can be run in all its ramifications. See Staff.

Head Resistance. Opposition offered by the air to a forward moving body. With objects moving over land or water, head resistance is measured independently of the impedance offered by the resistance of the water or by the friction resistance between wheels and road or track. For all geometrically similar bodies inclined at the same angle to the air stream, head resistance experienced is directly proportional to the density of the air and the square of the speed. This fundamental law of aerodynamics holds good for land vehicles, ships, aircraft, rockets, and projectiles fired from guns. Near the ground, density variation, which governs head resistance, is negligible, but density decreases rapidly with height; at 22,000 ft. it is only half that at ground level, consequently resistance is halved also. Air density and head resistance being less at greater heights, high speed aircraft fly at high altitude.

Doubling the speed at ground level squares head resistance, and trebling the speed cubes it. When a speed approximating to that of sound, 770 m.p.h., is achieved at sea level, head resistance attains a maximum which cannot be overcome. Practical application of this theory is to design objects offering the minimum opposition to head resistance as their speed increases. See Aerodynamics; Faring.

Head Voice. Highest part of a human voice, so called because the sensation is as of sounds originating in the upper part of the head. The term is sometimes used synonymously with falsetto (*q.v.*). See Singing; Voice.

Health. Sound condition of the entire animal organism in which the mind and all the organs function perfectly together. The

word preserves the A.S. *hæth*, as to heal preserves *hælan*, both from *hāl*, hale, safe, sound. Medical practice regards the conservation of health as of equal importance with the cure of disease.

Custom of Drinking Healths

The widespread custom of drinking healths derives from the ancient religious ceremony of pouring libations to the gods, originally at the time of offering sacrifice, and afterwards on solemn occasions, as at ceremonial feasts. This custom was practised by the Greeks and Romans, and with other heathen customs was adapted to their own use by many Christianised peoples. The heathen tribute of honour to the gods, followed by one to the memory of the dead, became among Christians invocations to God and to the saints. From thought of the blessed dead it was a natural transition to tender thought of absent but living friends, and from them again to the friends present in the flesh.

The same sacramental aspect of the wine-cup is seen in the ancient custom of princes and knights pledging mutual amity by drinking to the health of one another. In course of time the formality lost much of its significance, and in the 17th to 19th centuries the merely social custom became so tyrannical in the strictness of its etiquette, to say nothing of the extravagant absurdities attendant upon the proposal of a toast (*q.v.*), that by common consent the toast-list, or number of healths formally drunk at banquets, has now been reduced to the narrowest limits.

Traces survive of long-ago days when the pledge of friendship symbolised by drinking to mutual health was not exchanged without mutual suspicion. Thus the glass bottom to a pewter mug provides the drinker with opportunity of watching for a stealthy blow; and when the loving-cup is passed round, one guest holds the cover in his dagger-hand while his neighbour drinks to him, or if the cup be lidless, the guest who drinks is guarded on either hand by his next neighbour, all three standing simultaneously. See Insurance.

Health for Scotland, DEPARTMENT OF. Department of the secretary of state for Scotland established under the Reorganization of Offices (Scotland) Act, 1928, to take the place of the Scottish board of health set up in 1919. The department is concerned with (1) general supervision of the National Health Service in Scotland; (2) the administration of the Housing

(Scotland) Acts, and supervision of housing programmes and of grants to local authorities; (3) administration of the Town and Country Planning (Scotland) Acts; (4) supervision of water supply, sanitation, care of the aged, and other health and welfare services as applied to Scotland.

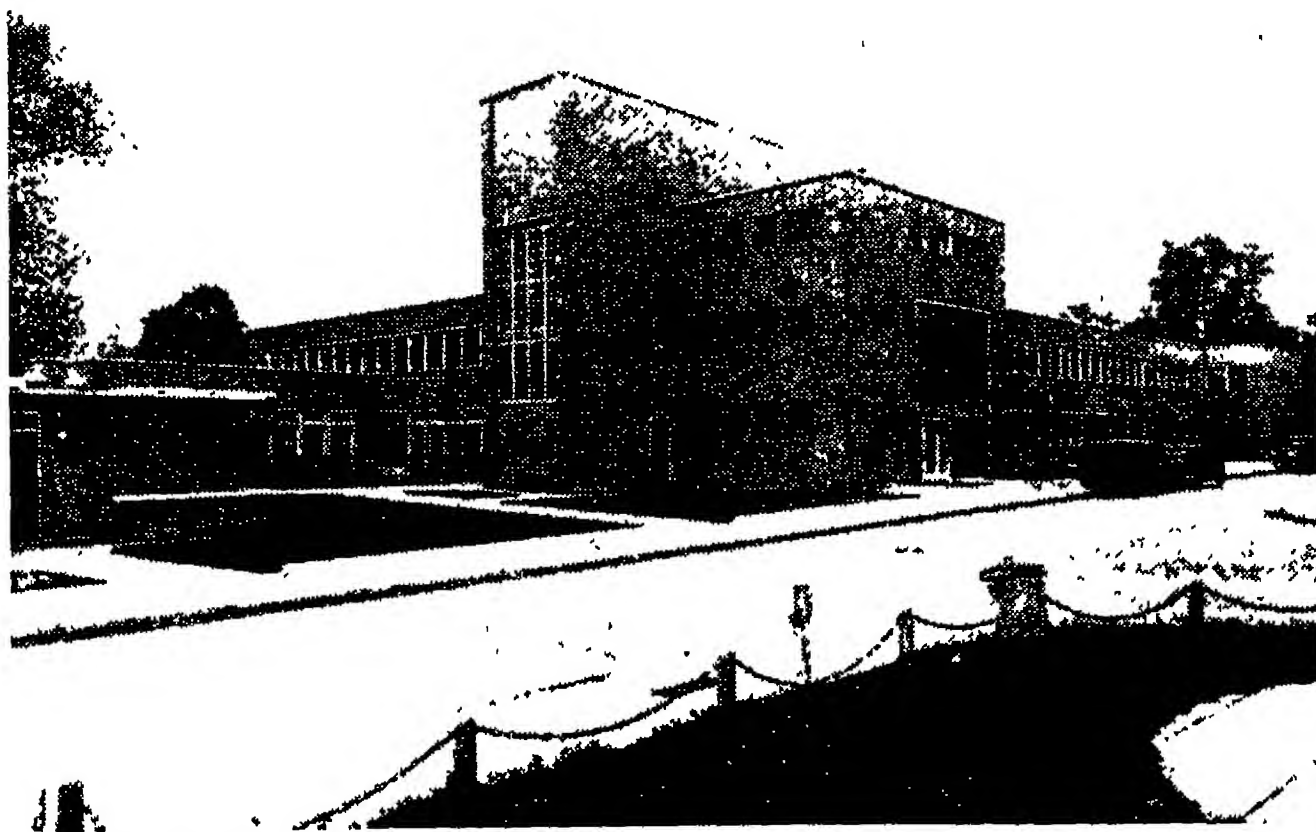
The headquarters of the department is at St. Andrew's House, Edinburgh 1.

Health, MINISTRY OF. Department of the British civil service. It is concerned with the administration of the National Health Service (*q.v.*), and related matters such as nursing, mental health, nutrition, local authority health and welfare services, and international health.

It was established in 1919 to take over for England and Wales functions relating to health and local government formerly exercised by the local government board and the national insurance commission. Insurance and pensions were transferred in 1945 to the new ministry of National Insurance. Housing, and matters relating to local government, rating and valuation, water and sewerage, etc., were transferred in 1951 to the ministry of Local Government and Planning (renamed later in 1955 ministry of Housing and Local Government).

The ministry has no jurisdiction in Scotland (*p.s.*) or N. Ireland. Many of its functions in Wales are exercised through the Welsh board of Health, with headquarters at Cardiff. At the head of the ministry is a minister whose official salary is £5,000 a year. He is responsible to parliament for his department, and also for the work of the board of control in relation to lunacy and mental deficiency, and for the department of the registrar-general for England and Wales. He is also a member of the committee of the privy council for medical research. There are also a parliamentary secretary, and a permanent staff of civil servants under a secretary. The offices of the ministry are in Savile Row, London, W.1.

Health Centre. Building or group of buildings from which medical and social services are supplied to the community. The National Health Service Act, 1946, placed upon local authorities the duty of setting up, equipping, and maintaining health centres providing all or any of the following services: general medical services by medical practitioners; general dental services by dental practitioners; pharmaceutical services



Health Centre. Woodberry Down, Stoke Newington, first complete centre built under the National Health Service Act, and opened 1952

by registered pharmacists; services which the local health authority is required or empowered to provide; health education.

The types of building used as health centres and the scope of the services provided by them vary considerably in different parts of the world, even in the same country. As regards the area and pop. best served, it is probable that a single health centre can deal adequately with maternity, child welfare, and school medical services required by a pop. of 10,000—the optimum being fewer. Geographical and topographical considerations, e.g. the convenience of the people served, also have to be borne in mind.

Health centres began in the U.S.A., where the idea was conceived of decentralising some of the functions of public health departments into district health centres, at the same time centralising health activities within districts. In the development of the idea, Boston led the way, and by 1936 had 11 neighbourhood health centres. Such centres, developed by cooperation between voluntary agencies (including the American Red Cross) and health departments, proved to be of great value in both preventive and curative medicine.

In some countries of Europe health centres have been developed, often on the American model; while in China the League of Nations bulletin for 1936 stated that provincial health centres provided a diagnostic laboratory; hospital; midwifery school and mother and child welfare centre; school health centre; polyclinic; education and propaganda dept.

In Great Britain, a committee under Lord Dawson's chairmanship expressed the view in 1920 that the general practitioner was too isolated in his work, and described a health centre as "an institution wherein are brought together various medical services, preventive and curative, so as to form one organization." A report of the medical planning commission, 1942, described the accommodation and services that should be given in such centres. The white paper on the national health service, 1944, laid stress upon the value of the health centre as a medical care centre; and many local authorities in Great Britain had already built, before the passing of the 1946 Act, centres from which were supplied maternity, child welfare, school, medical, and tuberculosis services.

A health centre should be properly so called only when it is a neighbourhood centre of both social and medical activities, stress being laid on the social and preventive value of its services. The term cannot justifiably be applied to a building where only medical care is provided. A health centre can, however, be developed within a hospital; in fact, there are advantages in such a scheme. For an interesting experiment in the promotion of family health, see Pioneer Health Centre.

R. H. Parry, M.D.

Health Visitor. British state registered nurse with a further training in midwifery and holding a statutory qualification. Health visiting is a form of social service; its object is the education of the people in healthy living and in the knowledge of what is meant by

full physical and mental health and of what is necessary to attain it. The duties of a health visitor vary according to district. Through her, legal enactments affecting the health and welfare of a family are conveyed to the public. She visits homes and supervises children under school age in her district; attends the maternity and child welfare centre and advises mothers on the care and upbringing of their children and their personal health and hygiene during pregnancy and lactation. Her duties may include school nursing, visiting tuberculosis patients, and making special investigations.

Healy, MAURICE (1887–1943). Irish author and broadcaster. Born in Cork, Nov. 16, 1887, a nephew of Timothy Healy, he was educated at the Christian Brothers' College, Cork; Clongowes Wood College; and University College, Dublin. In 1910 he was called to the Irish, in 1914 to the English, bar. He won the M.C. in the First Great War; took silk in 1931; and was recorder of Coventry from 1941. He died May 9, 1943. In his forties, he came into public notice as author and broadcaster. His postscripts to the B.B.C. news early in the Second Great War were remembered for their wit, charm, and poignancy. He ranked as an authority on French wines and was a founder of the Wine and Food Society. Healy published *Claret and the White Wines of Bordeaux*, 1934; *The Old Munster Circuit*, 1939; *Stay Me with Flagons*, 1940.

Healy, TIMOTHY MICHAEL (1855–1931). Irish politician. He was born at Bantry, co. Cork, May 17, 1855, and went to the Christian Brothers' school, Fermoy. At 13 he started to fend for himself in Dublin; at 16 he was a rly. clerk in Newcastle-upon-Tyne, then a journalist in London. He was called to the Irish bar in 1884, having entered the house of commons in 1880 as Nationalist member for Wexford. He sat for various Irish constituencies until he retired from politics in 1918.



Timothy M. Healy,
Irish politician
Russell

Healy's gifts as an orator, with his wit and independence, soon made him a prominent figure in parliament and in the Irish party. He broke away from Parnell at the

split of 1890. He was expelled from the party in 1900, as he was opposed to the United Irish League, but was readmitted in 1908, only to be again turned out in 1910. He was made a Q.C. in 1899 and called to the English bar in 1903. First governor-general of the Irish Free State, Dec., 1922, he resigned after five years. He died March 26, 1931. *Consult* Memories and Anecdotes, Sir D. P. Barton, 1933.

Heanor. Urban dist. and market town of Derbyshire, England. It is 8 m. N.E. of Derby and is served by rly. (London Midland region). It stands on the Derbyshire coalfield, and the industries are coal-mining, ironfounding, engineering, pottery, and the making of hosiery and lace. There are a grammar school and a school of mining and engineering. Market days, Fri. and Sat. Pop. (1951) 24,395.

Heard (HENRY FITZ-) GERALD (b. 1889). British writer. Born Oct. 6, 1889, and educated at Sherborne and Caius College, Cambridge, he was literary editor of *The Realist*, 1929. He became known to a wide public through his fortnightly broadcasts, *This Surprising World*, 1930-33, and the series *Science in the Making*, 1934. He joined Aldous Huxley in the U.S.A. in 1939 and with him developed a mystical philosophy. A writer of considerable power, his chief publications included *The Emergence of Man*, 1931; *These Hurrying Years*, 1934; *Exploring the Stratosphere*, 1936; *Pain, Sex, and Time*, 1939; *Preface to Prayer*, 1945.

Hearing. Term used for the physiological sensation caused by vibrations which excite the auditory nerve. According to Helmholtz's theory there are in the ear certain vibrators tuned to varying frequencies of from 16 to 22,000 vibrations a second which respond to these vibrations. Each vibrator can excite its attached nerve filaments, and when it does so an impulse, which the brain centres are capable of distinguishing or specifying, is transmitted to them.

There are other implied attributes of the vibrators. They must, e.g., be easily set in motion, but quickly brought to rest. They may, by the amplitude of their own vibrations, signify to the brain the intensity of the vibrations impinging on them, and evoke the sensations corresponding to loudness. If a compound wave of sound falls on the vibrators, they can resolve it into its constituents, each vibrator picking out its sympathetic vibration,

so that the brain may recognize that the vibrations are fused, yet may be sensible of the constituents of fusion. The theory compares the basilar membrane of the ear to the strings of a piano, and it has been found that there are between 16,000 and 20,000 cross fibres in the membrane, sufficient to provide all the combinations to give the sounds we hear.

There are many difficulties in the acceptance of this theory and a number of others, more or less plausible, have been put forward. The Rutherford-Waller or "telephone" theory regards the basilar membrane of the ear as a telephone membrane; while Ebbinghaus considered that one tone set in motion not only certain vibrators, but others harmonically tuned to them.

In order to produce movement in these physiological vibrators, the vibrations reaching them must be of sufficient strength. That the necessary strength is extremely small may be realized from the fact that it has been estimated that the ear is affected by atmospheric vibrations of a wave length comparable to that of the wave length of light, i.e. the energy required to influence the ear is of the same order of magnitude as that which produces impressions on the retina of the eye.

Human and Lower Animal Hearing

The human ear varies in its ability to detect sounds which are produced by a very high number of vibrations, a falling off taking place after middle age; but few ears can detect more than 30,000 vibrations a second. A child can hear the pipe of a bat, but an adult can rarely do so. The lower limit is about 16 a second; the higher usually 22,000 a second. Animals are capable of detecting vibrations that are unheard by human beings, and Francis Galton devised a dog whistle of so high a note of vibration that only his dog could hear it. The Harlequin fly responds to its mate by a vibratory apparatus equivalent to a sound receiver, but the sound is quite beyond human ears. It has been shown by Campbell and Dye that there are "sound waves" of 800,000 vibrations a second.

The sensations of hearing fall into two groups classified as noises and musical sounds. Noises are caused by impulses irregular in intensity or duration; musical notes by periodic and regular vibrations. In musical tones are three characteristics: intensity, pitch, and timbre or quality. Intensity

depends on the amplitude of the vibration; pitch, on the number of vibrations in a given time. A high note has many vibrations; a low note few. Quality, the characteristic by which a tone is identified as proceeding from a particular instrument, or a particular human voice, depends on the fact that many waves of sound are compound waves, built up of other waves. The ear has the power of resolving and classifying these waves. Hearing is apparently very little affected by the use of one or both ears, though undoubtedly one ear corrects the faults of the other. Also it is more difficult to judge the direction of a sound when the hearing of one ear is impaired. G. T. Feshner has suggested that the ears perceive sounds at different pitches, so enabling a judgement to be formed as to the direction and, in many cases, distance from which sounds are coming.

Hearing is not universal among animals, there being no reason to suppose such a sense among the lowest vertebrates, for example. Spiders, earthworms, crustacea, etc., have been supposed to show responses to auditory stimuli. Insects have not been proved to show any sense of hearing, though fishes, which possess a structure analogous to the ear, respond to the vibrations of a tuning fork.

Though such animals as horses, dogs, and the higher vertebrates generally have a sense of hearing, its degree and range have not been fully ascertained. *See* Ear; Sound.

Hearing. In law, term used for the judicial procedure in any law case. Strictly speaking, the term is usually confined to equity cases, but in common usage it applies to the hearing of any lawsuit. The word is also used for a sitting of any commission appointed to hear the evidence for and against any proposition. *See* Procedure; Trial.

Hearn, LARGADIO (1856-1904).

Author. Born in Leicestershire (Santa Maura), one of the Ionian Islands,



Larcadio Hearn,
writer on
Japan

he was the son of an Irish army doctor by a Greek mother. He became a journalist in the U.S.A., but in 1891 went to Japan, where he was professor of English in the university of Tokyo, 1896-1903. He married a Japanese wife, became

married a Japanese wife, became

naturalised as a Japanese subject, and professed Buddhism. Hearn wrote with singular acuteness and charm on the people, manners, customs, and spirit of his adopted country. His works include *Glimpses of Unfamiliar Japan*, 1894; *Gleanings in Buddha Fields*, 1897; *Ghostly Japan*, 1899; *A Japanese Miscellany*, 1901; *Japan: an Attempt at Interpretation*, 1904. He died Sept. 23, 1904. His *Life and Letters*, by E. Bisland, appeared in 1906.

Hearne, THOMAS (1678-1735). English antiquary. Born at Littlefield Green, Berkshire, he was the



Thomas Hearne,
English antiquary

son of the parish clerk of White Waltham. Compelled to go out to work as a boy, he found a patron who sent him to school at Bray and later to S. Edmund Hall,

Oxford, where after graduating he was appointed an assistant in the Bodleian Library. In 1712 he became second keeper, but four years later was compelled to relinquish his position owing to his refusal to take the oath of allegiance to the

schools and Peterhouse, Cambridge. Professor of history at Southampton, 1900-10, he held the chair of modern history at Durham, 1910-12, and then went to London university as professor of medieval history. Here he instituted free public lectures and during 1923-33 arranged courses on the social and political ideas of groups of thinkers from Augustine to Herbert Spencer. He retired in 1934, and died at Oxted, March 10, 1946. His chief publications included *Main Currents of European History*, 1917; *Democracy at the Crossways*, 1918; *Survey of Socialism*, 1928.

Hearsay. English legal term. Hearsay evidence is that given by a witness who does not personally know the fact but is merely repeating a statement made by some other person. Such evidence is in general not admissible to prove the fact. There are, however, many exceptions: (1) admissions and confessions; (2) certain statements by deceased persons; (3) statements in public documents. See *Evidence*.

Hearse (Fr. *herse*, harrow). Wheeled vehicle for carrying the bodies of the dead to the place of burial. Hearses range from a simple box-shaped cart to elaborate

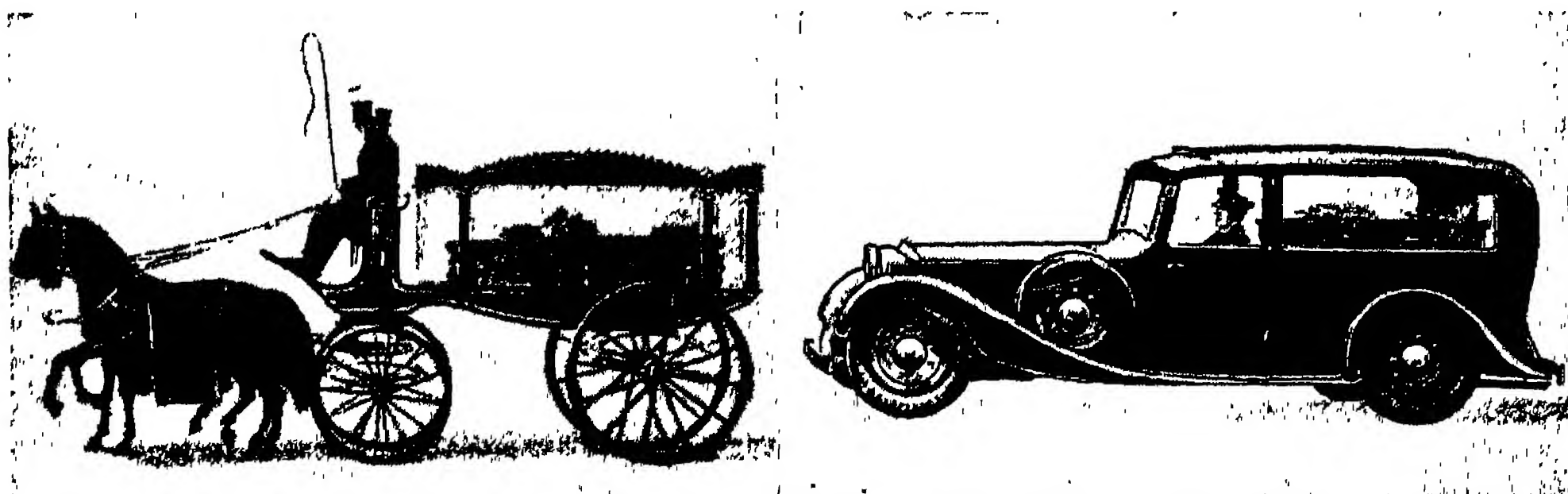
April 29, 1863, son of a Californian mining magnate and senator, in 1886 he secured from his father control of The San Francisco Examiner. In 1895 he bought The New York Morning Journal, ran it in opposition to The New York World, re-named it The New York American, and



W. R. Hearst,
American newspaper
proprietor

became owner of similar "yellow" journals in leading cities, as well as periodicals. His syndicates of feature articles reached an enormous number of readers of other journals. At one period his profits averaged 15 million dollars a year, his publications consumed 60 acres of forest a day in paper pulp, he had 70,000 men and women on his pay roll, and he paid his principal leader writer \$250,000 a year.

Hearst figured in campaigns against the trusts, achieved notoriety as the exponent of an anti-British policy, and was censured in 1906 by Roosevelt and Root for his part in the campaign against McKinley. He sat in congress, 1903-07. In 1904 he came second



Hearse. Left, traditional open horse-drawn vehicle with glass panels: right, type of motor hearse which has largely superseded the older type

Hanoverians. He died at Oxford, June, 1735, and was buried there.

His principal works are *Reliquiae Bodleianae*, 1703, and a *Collection of Curious Discourses on English Antiquities*, 1720. He edited Leland's *Itinerary*, 1710-12. Extracts from his diaries were published as *The Remains of Thomas Hearne*, 3 vols., 1869, and the publication of the whole was begun by the Oxford Historical Society in 1885.

Hearnshaw, FOSSEY JOHN COBB (1869-1946). A British historian. Born at Birmingham, July 31, 1869, he was educated at Walsall and Manchester grammar

schools and Peterhouse, Cambridge. Professor of history at Southampton, 1900-10, he held the chair of modern history at Durham, 1910-12, and then went to London university as professor of medieval history. Here he instituted free public lectures and during 1923-33 arranged courses on the social and political ideas of groups of thinkers from Augustine to Herbert Spencer. He retired in 1934, and died at Oxted, March 10, 1946. His chief publications included *Main Currents of European History*, 1917; *Democracy at the Crossways*, 1918; *Survey of Socialism*, 1928.

Hearst, WILLIAM RANDOLPH (1863-1951). American newspaper proprietor. Born at San Francisco,

in the Democratic nomination for the presidency. He received large votes for the mayoralty of New York city in 1905 and 1909, and for the governorship of New York state in 1906 and 1910.

In 1916 the British government refused to allow the international news service controlled by him to use the cables from Great Britain. The Canadian postmaster-general prohibited the entrance of Hearst newspapers into Canada. The embargo was withdrawn in spring, 1918. In 1930 the French government expelled Hearst from French territory for his part in the publication of a secret document

HEART

relating to naval negotiations. In 1938 he turned his papers over to a management committee, and sold two-thirds of his art treasures, as well as the castle of St. Donat's in Wales, which he had purchased in 1925. He died at Beverly Hills, Calif., Aug. 14, 1951. Part of his collection of armour was bought for the Tower of London in 1952 for £30,000.

Heart. One of the red suits in a pack of playing cards; or any

card belonging to that suit. Hearts took their present form early in the history of cards, probably as a modification of chalices, which in Spanish and Italian packs represented the clergy among the four orders of the community. Lewis Carroll introduced the royal family of hearts into Alice's Adventures in Wonderland, making use of the old nursery rhyme beginning "The queen of hearts, she made some tarts."

HEART: THE HUMAN PUMP

E. A. Schott, M.D. (Heidelberg), M.R.C.S.

A physiological description of the heart and its action is followed by an explanation of the symptoms and causes of the principal forms of heart disease. See also articles on other parts and organs of the body

The heart is the organ acting as a pump which propels the blood through the circulatory system.

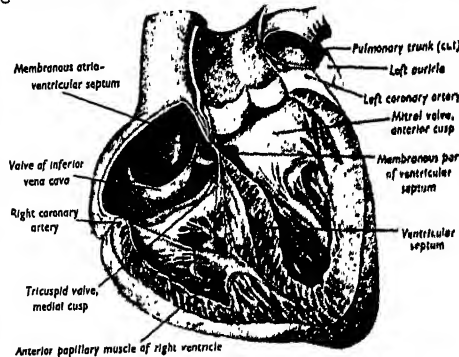
While references to the circulation of the blood are found in the earliest known records (Egyptian papyri of the 15th century B.C.), and the Chinese are believed to have had some knowledge of it as early as 2000 B.C., the discovery of the true function of the heart was made by William Harvey (q.v.), whose epoch-making book *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* appeared in 1628. The human heart has been closely associated in the popular mind with the emotions, as the folklore and poetry of many countries show.

Propulsion of Blood

A pump mechanism for the propulsion of blood is present in most animals. In most fishes the heart is a single tube which forces the blood through the gills. This tube expands into various cavities which, from the tail forwards, are the sinus venosus, auricle, ventricle, and bulbus cordis. In some form these parts can be traced in all the higher animals: the heart of amphibia contains a sinus venosus, two auricles, one ventricle, and a bulbus cordis; the ventricular septum begins to appear in the reptiles, being nearly complete in the crocodiles. Both septa are complete in the birds, in which the sinus venosus is no longer a separate chamber, but becomes absorbed into the right auricle, as is the case in the mammals.

In the human embryo the heart develops in front of the pharyngeal region from a simple tube in which four expansions, separated by grooves, form; these are the sinus venosus, the primitive atrium, the primitive ventricle, and

the bulbus cordis. By bending on itself the tube assumes the form of an S-shaped loop. The sinus venosus is absorbed into the right auricle; the atrial portion divides into a right and left auricle by growth of (endocardial) cushions, and of a septum (which itself is formed by fusion of the remaining parts of two septa); other septa grow to divide the primitive ven-



Heart. Section showing the ventricular septum. On the right side the atrioventricular orifice has been cut across. On the left side the section passes through the aortic orifice and in front of the atrioventricular orifice. From Gray's Anatomy, by permission of Longmans, Green & Co.

tricle into a left and right chamber, and the part of the bulbus cordis, which is in proximity to the heart, into the aorta and pulmonary artery.

The heart of a human being lies in the chest between the two lungs, behind the lower two-thirds of the breast bone, in front of the oesophagus and above the diaphragm on which it rests. It is roughly conical in shape, with its base directed upwards, to the right and backwards, its apex downwards, to the left and forward. Normally about one-third of the organ lies to the right and two-thirds to the left of the mid-

line. Its average weight is c. 300 grammes (10½ oz.), and its size is roughly the same as that of its owner's closed fist. It consists of four chambers: right and left auricle or atrium, and right and left ventricle. The right ventricle and auricle lie in front, the left ventricle and left auricle behind, the left ventricle also forming the left border and the apex of the heart. Each auricle has an extension; these extensions are called the auricular appendages. The auricles are separated from one another by the interauricular septum, the ventricles by the interventricular septum. The left auricle communicates with the left ventricle by the left auriculo-ventricular or mitral orifice, the right auricle with the right ventricle by the right auriculo-ventricular orifice. The venous blood returns to the right auricle through the great veins (superior and inferior vena cava) and the coronary sinus, and reaches the right ventricle through the right auriculo-ventricular orifice. The right ventricle propels it into the pulmonary artery through the branches of which it reaches

the lungs, there to take up oxygen and give off carbon dioxide. The blood thus arterialed returns to the left auricle by the four pulmonary veins, passes into the left ventricle, through the left auriculo-ventricular (mitral) orifice, and is ejected by the left ventricle into the aorta, the branches of which carry it into the various parts of the body.

Four valves ensure that the blood flows in one direction only: (1) the tricuspid valve, guarding the right auriculo-ventricular opening which consists of three cusps, the close apposition of which during ventricular contraction prevents the backflow of blood from the right ventricle into the right auricle; the free border of the cusps is attached by means of fibrous cords (chordae tendineae) to muscular projections in the interior of the right ventricle (musculi papillares), the contraction of which prevents the cusps of the valve from being driven into the right auricle by the blood stream; (2) the pulmonary valve,

at the origin of the pulmonary artery from the right ventricle, consisting of three semilunar folds which prevent backflow of the blood from the pulmonary artery into the right ventricle during relaxation (diastole) of the ventricles; (3) the bicuspid (or mitral) valve, guarding the left auriculo-ventricular opening, consisting of two cusps which during contraction of the ventricles prevent backflow of blood from the left ventricle into the left auricle by a mechanism essentially identical with that of the tricuspid valve described above; and (4) the aortic valve, at the root of the aorta, consisting of three semilunar folds which prevent regurgitation of blood from the aorta into the left ventricle.

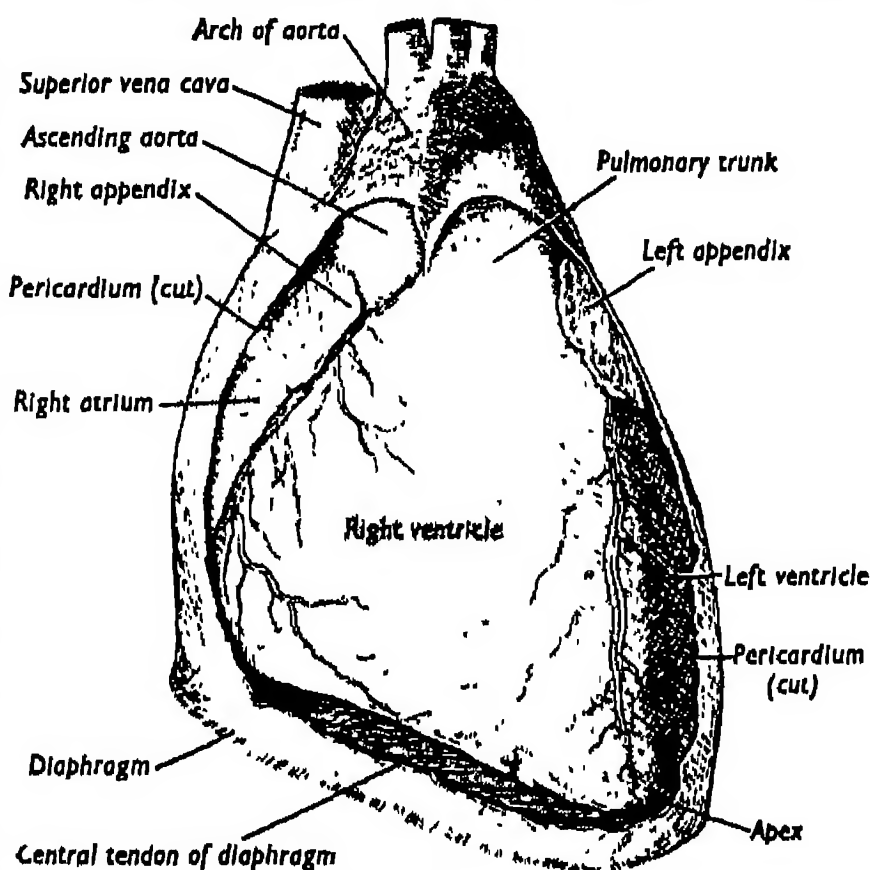
The heart consists of three layers: an inner lining membrane (endocardium), a muscular layer (myocardium), and a double outer lining membrane (pericardium) enveloping the heart. The heart derives its blood supply from the two coronary arteries which originate from the first part of the aorta; the venous blood of the heart returns to the right auricle via the coronary veins and the coronary sinus. The nerve supply of the heart is derived from the vagus nerve and the sympathetic nervous system.

The activity of the heart is rhythmical, consisting of alternating phases of contraction, called systole, and relaxation, called diastole. The two auricles contract virtually simultaneously, and so do the two ventricles; but the contraction of the auricles precedes that of the ventricles by about $\frac{1}{8}$ second. The normal heart rate at rest is 70-75 per min. in the adult, but varies considerably in different individuals. It is higher in the infant and as a result of exercise or excitement, and often lower in athletes and in the aged. The rhythmic contractions of the heart are due to impulses which originate in a definite area in the right auricle, near the orifice of the superior vena cava where there is an accumulation of cells of special structure: the sino-auricular node (also called the normal pace-maker). From there the stimulus spreads through the auri-

cles to another accumulation of specialised tissue situated at the junction between auricles and ventricles, called the atrioventricular node. Thence it is conducted along (and to) the interventricular septum by the bundle of His (so named after its discoverer) and through its two main branches the ramifications of which, called Purkinje fibres, conduct the impulses to the ventricles. This anatomical arrangement and the high rate of conduction of the impulse through the network of Purkinje fibres (4 meters per sec.) result in the activation of the whole of both ventricles by the impulse in less than $\frac{1}{10}$ second.

Starling's Law

The heart muscle possesses the properties of excitability and contractility, i.e. it responds to (intrinsic and external) stimuli by contracting. Throughout the period of contraction (refractory phase) it does not respond to exter-



Heart. Anterior view of the organ and the pericardium. The anterior part of the pericardium has been removed.
From Buchanan's Anatomy

nal stimuli; it is subject to the "all-or-none" law, which means that if a stimulus is sufficiently strong to provoke a response, the muscle contracts with the full force it is capable of exerting. This force varies with the initial length of the muscle fibres (Starling's law), the length of the preceding period of relaxation (diastole), and the state of nutrition of the heart muscle.

When a physician suspects that a person has heart disease he requires to have a detailed medical history of the patient as well as to make a thorough general examination, including examination of other parts of the circulatory system, e.g. of the pulse in arteries and veins, and of blood pressure

Examination of the heart itself is mainly directed to obtaining information about the condition of its various parts, its position, size, shape, and mode of action.

Inspection and palpation of a person's chest show in many, though not all, a pulsation with each heart beat at a point about $3\frac{1}{2}$ ins. to the left of the midline between the 5th and 6th ribs; this "apex beat" is caused by the forward thrust of the apex with each contraction of the ventricles. By locating the apex beat as well as by the percussion of the heart some idea about the size and position of the heart can be obtained. The normal heart produces two sounds which can be heard by a stethoscope (auscultation) or recorded graphically (phonocardiography). Far more accurate information about the size, shape, position, and mode of action of the heart can be obtained by means of X-rays, by which the shadow of the pulsating heart is studied on a fluorescent screen and photographs of the X-ray picture of the chest are taken.

Electrocardiograms

By this method the heart is visualised since the air-filled lungs allow the X-rays to penetrate whereas the blood-filled heart intercepts them. During each contraction the heart produces changes in electrical potential (action currents) which spread throughout the body and which can be recorded by suitable instruments; such records are called electrocardiograms. The basic fact underlying this method is that the active part of a muscle is electro-negative as compared with the inactive ones. The features of such tracings therefore depend on the site of origin and mode of spread of the excitation wave through the heart which is accompanied by the changes in electrical potential. Electrocardiograms give information about the rate and rhythm of the heart as well as of the condition of the heart muscle, since disease of the myocardium affects the mode of spread of the excitation wave and thereby produces changes in the record.

By studying the effect upon the heart of physical exercise information about the functional state of the heart is obtained.

The normal heart has great reserve power and adaptability which make possible a quick adaptation to the increased demands caused by exercise; in strenuous exertion the output of

blood may be increased from 7 pints per min. (an average normal at rest) to 70 pints per min.

DISEASES OF THE HEART. Two main groups of conditions may be distinguished: those associated with structural changes sometimes called organic heart disease, and those without structural abnormalities in which only the function of the heart is affected. Combinations of the two often occur.

Structural heart disease may be congenital, i.e. exist from birth, or acquired. Congenital heart disease is rare, in most cases it is due to malformation of a part or parts of the heart. Several groups of such conditions are recognized according to whether or not an abnormal communication between the two sides of the heart exists and whether and to what extent blood flows through abnormal short-circuiting channels (shunts) from the right to the left side in the heart or the great vessels originating from it. Considerable progress has been made recently in the diagnosis of congenital heart conditions, some of which have been found to be amenable to surgical treatment.

The three most important causes of acquired structural heart disease are infections, long continued strain on the heart, and degenerative changes of the heart muscle due to atheromatosis (arteriosclerosis).

Effect of Rheumatic Fever

Of all infections, rheumatic fever affects the heart most frequently and most seriously. Rheumatic heart disease is one of the most important conditions resulting in death or prolonged invalidism of young people. In the acute stage rheumatic fever tends to affect all three layers of the heart, causing inflammation of the endocardium (endocarditis), of the myocardium (myocarditis), and of the pericardium (pericarditis). Healing of the endocarditis is often associated with scarring, which produces thickening, shortening, and deformities of the valves and their cords of attachment, resulting in chronic valvular heart disease: narrowing of the valvular orifice (valvular stenosis, a condition treated surgically with some success by valvulotomy) or leaking of the valve (valvular incompetence), sometimes both; the left valves (mitral and aortic) are almost exclusively affected directly. In this condition murmurs are heard on auscultation of the heart which may precede, follow, or

replace one or both of the two normal heart sounds; the time of occurrence, the character, and the site of the murmur make possible diagnosis of the type and site of the valvular lesions.

Forms of Valvular Disease

Subacute bacterial endocarditis is an infection usually caused by a certain type of streptococcus which in most cases affects persons with chronic valvular heart disease. In this condition, previously almost invariably fatal, penicillin seems to be effective at least in a certain proportion of cases. Acute bacterial endocarditis differs from the subacute form in producing severe destruction of the valves; it is caused by a variety of micro-organisms, the heart condition forming only a part of a general blood invasion by those germs; it is usually rapidly fatal.

Many other infections may affect the heart, especially during the acute stage of the infection, but as a considerable number of them can now be controlled by drugs their permanent effect on the heart is less serious and rarer than it was a few decades ago. Mention may be made of the toxic damage to the heart muscle by the toxin of the diphtheria bacillus, and of pericarditis in tuberculosis, in the late stages of certain kidney diseases, and in thrombosis of a coronary artery. Many conditions formerly believed to be myocarditis are now known not to be true inflammation of the heart muscle.

If syphilis affects the circulatory system, it causes a special kind of inflammation of the first part of the aorta often affecting the orifices of the coronary arteries. Thence it may spread to the aortic valve, causing aortic incompetence.

The second important group of structural heart diseases is that caused by long continued strain imposed on the heart. Chronic high blood pressure produces this kind of strain in respect of the left ventricle, a rise in pressure in the pulmonary artery and its branches (from various causes) in respect of the right one. The wall of the ventricle, which has to carry out an increased amount of work owing to the increased pressure against which it expels the blood, increases in thickness (hypertrophy), and eventually its cavity enlarges (dilatation). In advanced cases with heart failure both sides of the heart are usually involved.

Atheromatosis of the arteries, in particular of the coronary

arteries, is the most important cause of degenerative changes in the heart muscle and predisposes to thrombosis of a branch of a coronary artery (coronary thrombosis). It is one of the most important causes of death in middle aged and elderly individuals, death often occurring suddenly. An important symptom of atheromatosis of the coronary arteries is angina pectoris.

Functional disorders of the heart without any constant structural changes may be caused by a great variety of factors, e.g. by abnormal conditions elsewhere in the body such as certain forms of goitre and Graves' disease; by some forms of nutritional deficiency; by excess of nicotine; and by emotional factors. Effort syndrome or neuro-circulatory asthenia is a condition in which symptoms of heart and nervous disorder occur in predisposed individuals as a result of physical or mental fatigue, and is commonly associated with an anxiety state.

Organic heart disease may be present without giving rise to any symptoms. Many persons with some structural abnormality of the heart are able to lead normal lives, the heart compensating for the lesion by adapting its function so as to provide an adequate circulation.

Signs of Heart Failure

When the heart begins to fail certain changes invariably make their appearance. In congestive heart failure shortness of breath is the earliest and an important symptom, occurring at first as a result of severe exertion, but, with increasing heart failure, after an ever slighter degree of exercise, even at rest, and in certain forms of heart failure at night (cardiac asthma). Fluid accumulates in various parts of the body resulting in swelling of the ankles and legs (oedema), enlargement of the liver, retention of fluid in the lungs, chest, and abdomen (dropsy); in certain forms of heart failure a bluish discoloration of the skin (cyanosis) develops, especially marked in some of the exposed parts of the body. The heart is nearly always enlarged.

Angina pectoris is a discomfort variously described as a feeling of oppression, constriction, or pain in the chest, usually behind or to the left of the breast-bone, often radiating to the shoulder and arms (far more commonly to the left). It may occur intermittently, being precipitated by exertion or excitement and aggravated by a

heavy meal and by cold (angina of effort). The same kind of discomfort may occur at rest. In its most severe and prolonged form angina of rest is encountered in coronary thrombosis. Angina pectoris is a result of a disproportion between oxygen supply to, and oxygen demand by, the heart and is most commonly caused by coronary artery disease, but occurs in a variety of other conditions.

Palpitation is an unpleasant feeling of being conscious of the heart's action; it occurs normally with excitement and effort, otherwise mainly in certain forms of irregular heart action, certain valvular lesions, Graves' disease, etc., and is an outstanding symptom in neuro-circulatory asthenia.

Cardiac Arrhythmias

One common form of irregular heart action (arrhythmia) is a variation in heart rate with respiration, called respiratory or sinus arrhythmia, and is normal in children and young adults and occurs in highly-strung individuals; it never denotes heart disease. So-called missed beats is an arrhythmia caused by a premature contraction of the heart followed by a longer pause; it is generally found in healthy hearts, though it may be associated with heart disease. Auricular fibrillation is a condition in which the normal contraction of the auricles is replaced by fine twitchings occurring at a rapid rate and in which the ventricles contract in a completely irregular rhythm; it is almost always associated with some form of heart disease.

Abnormally slow heart action is called bradycardia; heart rates of about 50 per min. and even lower may be normal for certain individuals; bradycardia in elderly persons is usually due to atheromatosis and may (but need not) be due to complete heart block, a condition in which the ventricles contract independently from the auricles owing to an interruption of the conduction of the stimulus of contraction from auricles to ventricles.

Abnormally fast heart action is called tachycardia; several forms are distinguished according to the mechanism of the heart action during the periods of fast action. While certain forms occur in connexion with heart disease, tachycardia in itself does not denote the presence of the disease.

The treatment of patients with heart disease calls for a detailed study of each case individually together with the setting in which

he or she lives. When applicable and possible the underlying condition is treated. Adjustment of the patient's life according to the kind and degree of heart disease is essential, and special attention must be paid to the appropriate kind and amount of work and other activities, both mental and physical, adequate periods of rest, and avoidance of overstrain and fatigue. In many cases some dietetic readjustments are essential, though severe restrictions in the diet are rarely required in uncomplicated cases. Drugs occupy an important place, the choice of the drug and its dose being dependent on the condition and the individual's reaction. Digitalis, sedatives, quinidine, and a great number of drugs, promoting the elimination of fluid from the body, are the ones most commonly prescribed. The psychological aspect of heart disease is most important and every consideration to it must be given in the treatment. Some patients are improved by blood letting and in others the administration of oxygen is of great value. Physical treatment—massage, gymnastic exercises, medicinal baths—is beneficial in some instances; they can with advantage be combined with graduated exercise in suitable cases.

Heartbreak House. Comedy in 3 acts by Bernard Shaw. Described by its author as "a fantasy in the Russian manner on English themes," it was first produced at the Court Theatre, London, Oct. 18, 1921, when Edith Evans (*q. v.*) created the part of Lady Utterword. Unlike many of Shaw's plays, it has emotional content and a romantic setting. The original production was denigrated by the critics, and Shaw publicly challenged their judgement. Revivals in London included those at the Queen's, 1932; Westminster, 1937; Cambridge, 1943.

Heart-burial. Burial of the heart apart from the body. This practice dates from remote times, and in Europe was apparently most common in the 12th and 13th centuries. It was possibly due to the notion that the heart was the seat of the noble qualities, a motive perhaps reinforced later by a pious desire to secure the prayers of more than one community for the soul. Crusaders had their hearts buried in Jerusalem.

Among kings of England whose hearts have been interred apart from their bodies are Richard I, whose heart was buried at Rouen;

Henry I and Henry III, both in France; Edward I, at Jerusalem; and James II, at Chaillot, near Paris. That of Eleanor, queen of Edward I, was buried at Lincoln.

The heart of Robert Bruce, after many adventures, was eventually placed in Melrose Abbey, instead of at Jerusalem, as he had wished; the heart of Paul Whitehead, secretary of the Medmenham "Hell Fire" Club, was buried with much pomp in the Le Despenser mausoleum at West Wycombe, Bucks, in 1775; and that of Daniel O'Connell at Rome. The practice was prohibited by Pope Boniface VIII, but again permitted by Benedict XI. A modern example is afforded by the burial at Stinsford, Dorset, in 1928 of the heart of Thomas Hardy, poet and novelist, whose ashes lie in Westminster Abbey.

Heart of Midlothian, THE. Scott's seventh novel, the second of The Tales of My Landlord series, and adjudged by good critics the best of the Waverleys. It is a story of infinite pathos, with a heroine in humble life (Jeanie Deans), whose sweet naturalness and devotion to her erring half-sister Effie have moved the hearts of novel readers all over the world since the book was first published in June, 1818.

Its principal features are Effie Dean's romance, her trial for child-murder, the true-blue Presbyterianism of her father, "Douce Davie," the self-sacrifice of the deputy-schoolmaster, Reuben Butler, and his courtship of Jeanie; the quaint characters of the two lairds of Dumbiedikes; the fateful figure of the ne'er-do-well, Staunton; the tragedy of Meg Murdockson and her daughter, Madge Wildfire; and the picture of the Porteous Riot (1736), with which the story opens. The title is taken from the old Edinburgh Tolbooth (prison). Daniel Terry dramatised the novel in 1819.

Heart's Content.

Seaport of Newfoundland. In the S.E., it stands on the E. side of Trinity Bay, and has a good harbour used by fishermen and others. Here is the terminus of the cables from Valentia, Irish Republic.

Heartsease OR WILD PANSY (*Viola tricolor*). Herb of the family Violaceae, native of Great Britain, N. Europe,



Heartsease, flower and foliage

N. Africa, and Asia. It differs conspicuously from the violets in the lyrate form of leaf with leafy stipules, and in the sepals having ear-like processes. The small flowers are whitish, yellow, and purple, the tints sometimes combined in one flower, sometimes distinct. Among other popular names for the flower were Love-in-idleness, Three-faces-under-one-hood, pawnee, or pansy (*Fr. pensée*). The last name has been adopted generally for the many wonderful

garden forms evolved by selection and breeding from the little wildflower. See Pansy.



Heartseed. Foliage, flower, and seed pod

Heartseed
(*Cardiospermum halicacabum*). Climbing herb of the family Sapindaceae, native of the tropics. Its leaves are divided into coarsely toothed, lance-shaped leaflets. The small greenish-white flowers form short sprays. The seed vessel is a bladder-like capsule, and the round seeds bear a heart-shaped

scar, whence the name. An alternative native name is balloon vine.

HEAT: A MANIFESTATION OF ENERGY

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Here are described the various theories of heat and its measurement, serving as a general introduction to the many articles in this Encyclopaedia dealing with heat in its various manifestations. Among such articles are Conduction; Freezing point; Fusion; Melting point; Thermo-dynamics. See also Heating

The common sensations experienced by everyone who touches the surface of a body lead to a rough classification of bodies as "hot" or "cold." Also the sensations experienced when in full view of the sun or a fire, or even when sufficiently close to a hot but non-luminous body, and the observations of the tendency of bodies which originally were unequally hot to come to the same state of hotness or coldness, impress on our minds the idea of the transference of something which we call "heat" from body to body. Care is required to avoid confusing the sensation of hotness and the concept of "temperature" based on them, with the concept of heat.

Measurement of Temperature

Historically the study of the science of heat began with investigations concerning the measurement of temperature. The sense of touch is neither sensitive nor precise enough to serve as a reliable guide in such matters. The invention of the first thermometers has been ascribed to various people, but certainly Galileo's claim is one of the best established, and in the hands of his pupils who formed the famous "Accademia del Cimento" at Florence, measurement of temperature attained a very fair standard of accuracy. These Florentine academicians adopted the glass bulb and stem, containing either mercury or spirits of wine, choosing as "fixed

points" the temperature of snow in the severest frost and the temperature of the bodies of cows and deer, and divided the stem between into 40 or 80 equal parts.

Fahrenheit's Discovery

G. H. Fahrenheit (1686-1736) perfected the mercury in the glass thermometer by discovering a simple process for cleaning mercury, and by observing that the temperature of a boiling liquid depends on the pressure impressed on its surface by the atmosphere or by artificial means. Having taken his zero to be marked when the bulb was in a mixture of ice, sal-ammoniac and water, and another fixed point to be indicated when the bulb was under the armpit of a healthy person, he divided this interval into 24 equal divisions; finding these to be too large, he sub-divided them into four equal parts.

On this scale he found that pure melting ice gave constantly 32, and he no doubt used this as a check on his graduation, and he found that boiling water was generally between 211 and 213, varying with the height of the barometer. Ultimately melting ice was taken as one fixed point and marked 32, and steam rising from water boiling under a pressure of one "standard atmosphere" (760 mms. or 29.92 ins. barometric height) was taken as another and marked 212. In 1742 Celsius of Upsala suggested the contestinal

division, and marked the "boiling-point" 0 and the "freezing-point" 100. Eight years later Strömer, also of Upsala, suggested the inversion of the numbers, and gave us the present scale of the "centigrade" thermometer.

As different liquids did not expand proportionately one with the other on receiving similar alterations in hotness, some difficulty was experienced in deciding on the points which were to be marked 1, 2, 3, etc., since mercury indicated a slightly different series from other suitable liquids such as alcohol, pentane, etc. Through the researches of Boyle and Amontons in the 17th century, of Gay-Lussac, Dalton, and Charles in the 18th and 19th, and of Bernoulli in the 19th century, the expansibility of gases had been very carefully observed, and the notable fact that their expansibilities were by no means equal had been clearly enunciated, especially for those gases like hydrogen, oxygen, nitrogen which are more "permanent," i.e. more difficult to liquefy.

By degrees the use of the hydrogen or nitrogen thermometer as a standard of comparison for all liquid-in-glass thermometers became the accepted practice in careful research, and the final touch was added by Lord Kelvin (then William Thompson) in 1848, when he established on purely theoretical grounds an "absolute thermodynamic" scale of temperature which is independent of the particular properties of any particular substance, and in collaboration with Joule of Manchester carried out a famous series of experiments to determine the slight deviations between the indications of a "gas" thermometer and the "absolute scale."

The Platinum Thermometer

This settling of the scale of measurement is quite apart from the great practical development which has taken place in recent years in the construction of thermometers for special purposes, such as measurement of very low or very high temperatures. Mainly owing to the labours of H. L. Callendar the "platinum" thermometer has become an instrument of great precision for such extremes as liquid gases and furnaces. In this type, alteration of temperature is measured by the variation experienced in the electric resistance of a wire of pure platinum mounted and insulated on a mica frame, protected in a tube of porcelain, and connected by suitable leads to apparatus for the accurate

determination of resistance. By inserting large porcelain test-tubes in furnaces, with their open ends just protruding through the wall, and measuring the amount of radiation proceeding from this opening, great precision has been introduced into furnace thermometry. In these "radiation pyrometers" use is made of Stefan's law that the amount of radiation emitted from such a "full radiator" varies according to the fourth power of the absolute temperature.

Thermoelectric Thermometry

Two dissimilar metals electrically connected to form two junctions give rise to an electromotive force, if the junctions are at different temperatures. This e.m.f. can be measured by means of a potentiometer or by using a suitable meter inserted in series with the so-called thermocouple. This type of thermometer is most useful for continuous recording of temperature and its low thermal capacity is particularly advantageous in, for instance, the measurement of skin temperature.

Thermocouples can be used up to $1,400^{\circ}\text{C}$., this limit being fixed by the suitability of the "sheath" to protect the element from the effects of furnace gases. Temperatures above $1,400^{\circ}\text{C}$. are measured by radiation and optical pyrometers in combination with a rotating sector between the source and pyrometer which allows only a known fraction of the radiation to fall actually on the pyrometer.

At very low temperatures in the neighbourhood of the normal boiling points of the so-called permanent gases the vapour pressure of a liquified gas is the property utilised to estimate temperature, a suitable manometer being used for this purpose. Resistance thermometers in which lead is substituted for platinum are also used at low temperatures.

Specific and Latent Heat

Care should be taken to avoid confusion between the famous discussions of the past as to the nature of heat, and the experimental work carried out for the purpose of measuring heat. Even at a time when views were entertained concerning the nature of heat, which are now regarded as inadequate, the question of its measurement had advanced a considerable distance along right lines. Early attempts to utilise the mechanical power of steam in Britain were made in the 18th century, and James Watt received great assistance from Joseph Black, of Edinburgh, who was the first to eluci-

date the ideas of "specific heat" and "latent heat."

One "gram-calorie" of heat is required to raise the temperature of one gram of water through one centigrade degree; but Black discovered that other materials had their specific amount of heat for similar changes, different for each substance. Thus, copper requires about $\frac{1}{11}$ of a calorie per gram per degree, iron about $\frac{1}{8}$, mercury $\frac{1}{25}$, ice $\frac{1}{2}$, turpentine $\frac{1}{2}$, etc. Such numbers are referred to as "specific heats" of copper, iron, etc., and a notable fact is the very large "capacity for heat" enjoyed by water in comparison with nearly all other substances, especially the materials of the earth's crust.

Black also discovered what is, in deference to historic tradition, still called "latent heat"; i.e. the fact that when a body changes state from solid to liquid or from liquid to vapour, a considerable quantity of heat is required to effect this change of state even without any change of temperature.

Quantities of Heat

For accurate work the actual mean temperature must be specified. Hence experimental results are quoted in terms either of the 15°C . calorie, which is the heat required to raise the temperature of one gram of water from 14.5°C . to 15.5°C ., or of the 20°C . calorie, which refers to the temperature change from 19.5°C . to 20.5°C .

Thus, the latent heat of fusion (melting) of ice at 0°C . is 80 calories per gram melted; of tin at 231°C ., 14 calories; of silver at $1,000^{\circ}\text{C}$., 21; of mercury at -39.5°C ., 3, etc.; the latent heat of vaporisation of water at 100°C . is 537 calories per gram vaporised; of ethyl alcohol at 78°C ., 210 calories; of turpentine at 156°C ., 69 calories, etc.

Similarly definite quantities of heat are involved in chemical changes as distinct from physical, and we speak of "heat of combustion," "heat of reaction," "heat of solution." In fact, in Black's mind there was little difference in nature between such heats and his "latent heats." He shared the view, common in his time, that heat was actually a subtle and highly elastic fluid material with different degrees of affinity for ordinary matter and also endowed with the property of self-repulsion. Black assumed that the apparent disappearance of the heat (since it produced no "sensible" change in the temperature of the atmosphere) was due to a quasi-

chemical combination between the "caloric" (as the hypothetical heat fluid was called) and the particles of the melting or vaporising substance, so that water was "ice cum caloric" and steam was "water cum caloric"—i.e. the caloric was latent in the water and in the steam.

Heat a Mode of Motion

The belief that heat is a mode of motion is to be found in the works of Francis Bacon, Descartes, Boyle, Hooke, Amontons, and Newton; but in their days the theory rested on very slender evidence, so perhaps it is not surprising that the 18th century philosophers abandoned it in favour of the material hypothesis; and, indeed, so long as we exclude from consideration the production of heat by friction and percussion, the caloric theory is an adequate explanation of thermal phenomena. But the literature of the 18th century teems with controversy on the subject, and the ingenious attempts of the "calorists" to evade the difficulties of frictional heat. The decisive blows at the caloric theory were struck by Benjamin Thompson and Humphry Davy.

In 1798 Rumford pointed out that in boring cannon out of solid metal the action of the borer poured out heat unlimitedly. "It is hardly necessary to add," he wrote, "that anything which any insulated body can continue to furnish without limitation, cannot possibly be a material substance." Davy melted ice by rubbing two pieces together by a mechanism in a vacuum. This controverted directly the view that caloric was squeezed out of the pores of a body or torn from combination with its particles by rubbing (this was the calorist's explanation of frictional heat); for, as everyone admitted, heat had to be communicated to ice, and not "torn from" it, to melt it.

Basis of Thermodynamics

J. P. Joule settled the matter finally. Evolving heat by friction of paddles in water, he measured the heat yielded and compared it in every case with the work required to maintain the paddles in motion, discovering that 1 pound-calorie (heat required to raise 1 pound of water through 1 centigrade degree) was produced by the expenditure of approximately 1,400 foot-pounds of work. These experiments repeated by several other workers under varying conditions form the experimental basis of the branch of physics known as thermodynamics. Its

main development on the theoretical side is contained in the researches of four great physicists: Carnot of France, Clausius and Helmholtz of Germany, and Lord Kelvin. Its great feature is the width of view and the fundamental nature of its conclusions, which can be arrived at without any appeal to a theory of heat. Nevertheless, as the human mind must speculate on ultimate nature, there is no doubt that its conclusions are much easier to relate to the dynamical theory of heat than to the material.

One of the most fruitful ways of attacking thermo-dynamical problems is by choosing a hypothetical heat engine which satisfies the particular requirements of the problem. The working substance, which performs the mechanical work when supplied with heat, is in all practical cases either air (in the internal combustion engine) or water (in the turbine and reciprocating steam engine). The atmosphere itself forms the working substance of a vast heat engine with the sun as the prime source of energy, and the cold and warm parts of the earth representing the sinks and sources respectively.

In thermal phenomena we believe we are witnessing the variations which go on in the degree and intensity of the motions of the molecules of a body. Increased agitation produces the sensations of heat, involves a sundering apart which we see in expansion, may even result in a complete rupture between molecules against cohesion, as when fusion or vaporisation takes place. What is transferred from body to body is not a material, but an amount of energy of motion, and so the science of heat in its widest development becomes merged in the study of transformations of Energy.

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Heath (*Erica*). Popular name for a genus of very evergreen shrubs of the family Ericaceae (*g.v.*). They are natives of Europe, Africa, and N. Asia. The slender, rigid leaves are much like small pine-needles, and are dis-

posed mostly in whorls. The four petals are united to form an egg-shaped, bell-shaped, or tubular corolla.

Four species are natives of the U.K., including purple heath (*E. cinerea*), that colours the heaths and moorlands in summer; the cross-leaved heath (*E. tetralix*), with delicately rosy-tinted flowers, in moist hollows; the crimson-flowered fringed heath (*E. ciliaris*) of S.W. England; and the Cornish heath (*E. vagans*) of the Lizard and Land's End. A fifth species is the Irish heath (*E. mediterranea*). Exotic forms, particularly those of S. Africa, are grown in English greenhouses; but the first species to be introduced was the S. European briar-root (*E. arborea*) in 1856.

Some of the most popular forms are hybrids of garden origin. In the open air they flourish in sand or peat in any position where rhododendrons would thrive. They should be planted in autumn or early spring. Greenhouse species are usually grown as specimens in pots, in soil composed of two-thirds peat and one-third silver sand. They are chiefly used for decorative purposes in early spring, and, after flowering, are stood out in the open air in a warm and sunny position before being taken into the greenhouse again in autumn. They are propagated by cuttings in spring and division of the plants in autumn, or may be increased by layering (*g.v.*).

The plant gives its name to any stretch of land grown over with shrubs. Such areas are common in England, *e.g.* Hampstead Heath, Mousehold Heath, Walton Heath. Often the name survives when the heath has disappeared, *e.g.* Haywards Heath.

Heathcoat, JOHN (1783-1861). British inventor. Born at Duffield, Derbyshire, Aug. 7, 1783, he was apprenticed to a smith, afterwards taking over a machinery business in Nottingham. He started in business as a lace and net manufacturer in Loughborough, and in 1808 produced his great invention, a machine for making imitation pillow lace. Other inventions included a steam plough and a process for purifying salt. In 1816 Heathcoat's factory at Loughborough was destroyed by the Lud-

dites (*q.v.*); consequently he moved to Tiverton, where he set up as a lace manufacturer. During 1832-59 he was M.P. for Tiverton, and there he died, Jan. 18, 1861.

Heather (*Calluna vulgaris*). Widespread shrub of the family Ericaceae. It is a native of Europe, W. Siberia, Azores, and N. America. The leaves are three-sided and minute, overlapping in four rows; the flowers honeyed and rosy-purple, the four stiff sepals being much larger than the bell-shaped corolla. The plant covers vast extents of heath and moorland. Its wiry stems and branches are useful for thatching, making brooms, and for fuel. See Ericaceae.

Heathfield. Village of Sussex, England. It is 15 m. S. of Tunbridge Wells, and has a railway station. It stands on the river Cuckmere, and had once a foundry where cannon were made. The church of All Saints is mainly a 15th century building which has been restored. Lord Heathfield, the defender of Gibraltar, took his title from here; he lived at Heathfield House, the old seat of the Dacres, and is buried in the church. From Gibraltar Tower, erected to his memory, there is a fine view. Heathfield "cuckoo fair," about May 10, is locally supposed to mark the beginning of summer. Pop. 3,650. *Prose* (locally) Hettle.

Heathfield, (Thomas) ARTHUR ESCOTT, 1st Baron (1717-90). British soldier. Born at Stobs, Roxburghshire, Dec. 25, 1717, he was educated at Leyden university, and served with the Prussian army, 1735-36. On his return to England he trained at Woolwich and was commissioned as field engineer. In 1739 he joined the 2nd Life Guards and was wounded at Dettingen and Fontenoy.

Colonel of the 1st Light Horse in 1759, he distinguished himself in the Seven Years' War under Prince Ferdinand. As major-general he was second in command in the Cuba expedition of 1763, and became lieutenant-general in 1765.



Heather. Leaves and flowers of *Calluna vulgaris*



1st Baron Heathfield, British soldier. After Reynolds

In 1774 he was appointed commander-in-chief in Ireland, but the following year was sent to command Gibraltar. In 1779 the Spanish opened the siege of the fortress, which Elliott held stubbornly for four years, before he was relieved by Lord Howe. On his return to England he was knighted and in 1787 raised to the peerage. He died at Aix-la-Chapelle, July 6, 1790.

Heathrow. A hamlet near Hounslow, Middlesex, England, 14 m. W. of London. In 1943 Heathrow became the site of London Airport (*q.v.*), opened for service in 1946. During excavations for the runways, remains were found of a settlement estimated to have been built in 600 B.C. They showed the ground outline of a square-moated building, a temple, and some huts.

HEATING: PRINCIPLES & PROCESSES

J. W. Cowan, A.M.I.H.V.E.

An explanation of theory and practice in regard to the raising of the temperature inside buildings to a degree acceptable to human life and activities. See also Air Conditioning; Boiler; Conduction; Fuel; Ventilation, etc.

In the warming of the interior of buildings—space heating in modern phraseology—the aim is to provide a reasonably comfortable temperature, and to maintain this against all variations of the outside temperature. Heating alone cannot establish optimum comfort. This requires, in addition to an equable temperature, an adequate supply of unvitiated air, and depends largely on the cleanliness and humidity of the air supplied.

The purpose of space heating is not, as it might seem, to make the occupants warm. It is, rather, to establish an environment that will promote the comfortable regulation of bodily warmth. In addition to generating and dispersing heat continuously, the human body is so equipped as to be capable, in health, of maintaining within itself an almost uniform temperature. With but slight variation, though not always without discomfort, the temperature of the blood remains constant at 98.4° F. and that of the skin at 91° F., though external conditions may range from extreme heat to extreme cold.

Heat Generated by the Body

In order that the temperature may remain constant, it is necessary that all the heat generated by the body be given off continually to the atmosphere. Some heat is lost in warm exhalation, but nearly 90 p.c. is given off through the skin. The dispersal of this heat is regulated automatically by a thermostatic nerve centre that sets up muscular action to expose more or less of the surface blood vessels to the cooling effect of the ambient air. When additional cooling is necessary, a further motor impulse stimulates sweat glands to pour out comparatively large quantities of

sweat. The consequent evaporative cooling then further reduces the skin temperature. These are reflex actions occurring involuntarily as a motor response to a sensory stimulus originating in temperature-sensitive nerve fibres adjacent to the surface blood vessels.

The motor response is the same whether the change to be countered arises from an external or internal source. Thus, a cooling reaction resulting in redness of the skin and sweating may be brought about by a too-warm or too-moist environment, but equally by vigorous muscular effort calling

Abridged List of Optimum Air Temperatures

	Fahr.°
Art Galleries	60
Assembly Rooms	60
Cinemas and Theatres ..	60
Gymnasiums	55
Hospitals	65 to 70
Offices	65
Schools	60
Sports pavilions	70
Dwellings:	
Living rooms	65
Bed-sitting rooms	65
Bedrooms	55 to 60
Nurseries	65 to 70
Entrance halls	60
Bathrooms	60
W.C.s	55

for the generation and, therefore, the dispersal of additional heat. Similarly, a heat-conserving contraction of the blood vessels, causing shivering and "goose-flesh," may arise equally from a too-cool environment, or from reduced heat generation due to illness or lack of food. The maintenance of an equable temperature not only promotes a feeling of comfort and well-being; it also tends to conserve nervous energy by evading the cumulative effect of repeated calls upon the reflexes that operate the thermoprotective equipment of the body.

It follows that the most comfortable temperature for a particular room or building depends on the purpose for which it is used and the degree of activity this entails. Clearly, more bodily warmth will be generated, and must, therefore, be given off, in a gymnasium than in a mercantile office. This is recognized by a difference of 10° F. in the design temperatures listed in the table given in the centre column.

The minimum permissible temperatures in factories cover the same range, *viz.* sedentary work 65° F., light work 60° F., and heavy work 55° F., except in rooms where a manufacturing process requires another temperature.

Maintaining a Design Temperature

In order to maintain a design temperature, it is necessary to provide an input of heat that will balance the total hourly loss of heat. This loss occurs partly by direct transmission through the fabric of the building, and also by an outflow of warmed air via chimneys, ventilators, and ill-fitting doors and windows. This naturally-occurring air movement, while accounting for an appreciable loss of heat, ensures a continuous flow of fresh, if cold, air into rooms not mechanically ventilated. The resulting change of air normally varies between one and two room-volumes per hour, but this can be increased to fully ten complete changes of air per hour by the burning of an open fire. It is largely for this reason that an open fire cannot adequately heat a room. At best, some 80 p.c. of the potential heat of the coal passes straight up the chimney, while currents of cool air flowing towards the fire from doors and windows substantially offset the efficacy of the remaining one-fifth of the heat actually radiated to the room.

Open Fire or Central Heating

The British preference for the open fire is thought to arise from an impression that central heating connotes overheating. In point of fact, current house warming practice inclines towards some measure of underheating. This method, known as background heating, adopts a design temperature of 50° F. to 55° F. which is maintained continuously, except during summer, auxiliary units, such as gas and electric heaters, or open fires, being used to "top up" a room temperature shortly before and while it is occupied. In a small house the background temperature can be maintained by a

radiator system coupled to a boiler behind an open fireplace, as in Fig. 1, but a separate heating boiler would be necessary in larger premises. In all cases, the lesser fuel consumption reduces the cost of the background heating to about half that of full heating.

Background heating can be assisted by warm-air ducts taken from a fireplace chimney, and by other aids to heat conservation, but, in common with full heating, depends primarily on an effective circulation of heated water. This has many advantages over steam heating, notably simplicity of operation, and freedom from dependence on mechanical controls. The lengthy warming-up period that follows each first lighting of the fire of a hot water system is reflected in the equally slow cooling of the water should the normal four to five hour stoking period be unavoidably extended on occasions. In contrast, a steam installation heats quickly because of the lesser volume of water, but cools with equal rapidity should the firing be neglected. Further, the maintenance of the designed steam pressure requires skilled boiler attention, or complete dependence on mechanical controls.

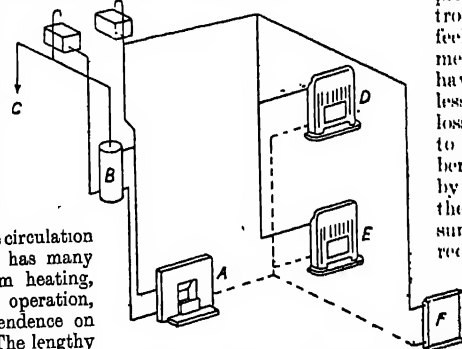
Higher Surface Temperature

The higher surface temperature reduces the size of radiators, but these may require guards to prevent contact with the steam backed surface, and may give rise to an unpleasant sense of burning owing to the scorching of solid particles in the air.

Heat is a form of energy necessary in varying degree to all forms of life. It is not necessarily associated with warmth, nor is it the opposite of cold. Hot and cold are virtually synonyms, being descriptive of the same phenomenon, just as a penny is, though less in value, as much currency as is a guinea. These terms serve only to indicate whether a particular temperature is above or below that of the skin.

Heat is transmissible in three ways, namely, by conduction, by convection, and by radiation, but only from a higher to a lower temperature. Conduction means the passage of heat from particle to particle throughout the mass of a substance, or from the hotter to the cooler of two objects in contact. This is not used directly in space heating, although it is by

this means that heat passes into the atmosphere through the metal walls of boilers, pipes, and radiators. It is by this agency that heat is lost from a warmed building, notably through glass.



Heating. Fig. 1. Background heating of house combined with hot water supply. A, open fireplace in living room with back boiler; B, indirect hot water cylinder; C, hot water supply to taps; D, "Fireaid" in bedroom; E, "Fireaid" in dining room; F, column radiator in hall.

Convection (Lat. *convellere*, to carry) implies the carrying away of heat by a moving column of water or air. Most space heating is effected by convection, first in water circulation (*v.i.*) and then in room-warming air movement. Air warming radiators are essentially convectors, and provide a maximum area of heated metal for contact with air; modern design ensures this by placing the heating unit, whether it be warmed by hot water, steam, gas, or electricity, low down in a tall and otherwise empty casing in order to increase the convective air movement by the flue or stack effect of the high casing. It is doubtful whether the radiant emissivity of an ordinary column radiator exceeds 15 p.c. of the total heat output.

Invisible Rays of Energy

Radiation refers to the emission of waves of thermal energy. It is not warmth, as such, that is liberated, but invisible rays of energy closely analogous with those of light. At normal temperatures, this energy is transformed into a sense of warmth only when the rays impinge upon, and are absorbed by, a surface cooler than the emissive plane. This energy does not warm the air through which it passes, and, like light, remains unaffected by both air temperature and air movement. This planet is warmed solely by radiant sun heat. Atmospheric warmth arises only from air con-

tact with surfaces that have already converted solar energy into terms of temperature.

Radiation offers several advantages over convection in space heating - notably, a lower air temperature, complete directional control of heat distribution, and a feeling of comfort by a person immediately on entering a room having a low air temperature. The lesser air heating, and the reduced loss of heat by air change, combine to reduce fuel consumption. These benefits are offset to some extent by higher installation costs, and by the large areas of wall or other surface unobscured by furniture required for distribution. For example, approximately the same area of heating surface is used whatever the method of distribution: in convection heating a 4-column radiator of 30 sq. ft. heating surface might measure 30" wide x 3' deep x 24" high; an equivalent radiant panel 2 ft. high would need to be 15 ft. long.

Methods of Distribution

Several methods of distribution are used. In one, small-bore steel or copper pipes through which hot water is pumped are embedded below the surface of the wall, ceiling, or floor so that the fabric of the building becomes the heat-emitting surface. In another, steel or cast-iron plates backed by waterways and insulating pads are fitted flush with the walls or ceiling; ceiling panels would not normally be used in rooms less than 10 ft. in height. One pattern, intended for a dado position, combines the radiant emissivity of a flat front with a fluted back designed for convective air heating of incoming fresh air. Another pattern is made for use at skirting level. Panels designed for floor heating are usually fitted with expanded metal, and are normally confined to the borders of passages and corridors, except in open-air auditoria and schools. Radiant panels, as distinct from embedded pipework, can be arranged for gravity circulation in small buildings; in larger premises, a pumped circulation would invariably be used. Such panels may be steam heated in a factory where the position admits of the higher surface temperature, or the waterways may be replaced by electric heating elements. Electrically heated wall or ceiling papers, electric "fires" fitted with reflectors, and gas heaters having refractory radiants act almost entirely by radiation.

Heating installations using pipework rely on a continuous flow of

the heat-bearing fluid (steam or water) throughout the installation, just as pipeless heating is dependent on a continuous movement of warmed air through concealed air ducts.

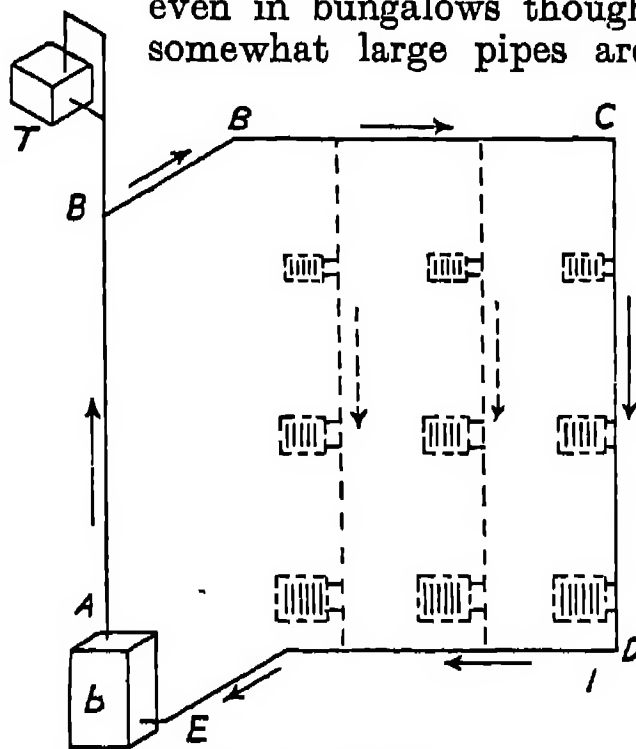
Steam flows freely under the influence of pressure. This may be a positive pressure, in excess of that of the atmosphere; or steam generated at or below atmospheric pressure can be caused to flow by the maintenance of a partial vacuum in the condense or return section of the pipework. The water of condensation is normally returned to the boiler in order to conserve heat, and to minimise the use of cold and possibly mineral-bearing make-up water.

Circulation systems

Water may derive the motive energy of its circulation either from gravity, or from the propulsion of an electrically driven pump, usually centrifugal, known as an accelerator. Gravity circulation relies on the difference in temperature and, therefore, in density of the water in two opposing columns, nominally the flow and return sections of the pipework. This

action can be understood by reference to Figs. 2 and 3. If the weight D in Fig. 2 were removed, the previously existing balance would be destroyed and the downward gravitational movement of the weights E to H would force upwards the lighter left side of the loop. A similar lack of balance would be established by lighting a fire in the boiler of Fig. 3. Increase of temperature would cause the boiler water to expand and, necessarily, to become less dense. In consequence, the AB column would then be less heavy than the still cold CD column, and would be displaced upwards by the downward gravitational movement of the cooler water. The continuous heating of the cool water entering the boiler, and the progressive cooling of the hotter water, combine to maintain the circulatory flow indicated by the arrows. The velocity of flow, perhaps 1 to 2 ft. per sec., increases with the difference in temperature between the two columns, or sets of columns—usually from 30° F. to 40° F.—and with every ft. of vertical height through which the descending cool water is permitted to

gravitate. Such systems are best suited to tall narrow buildings, but work quite satisfactorily in two-storey 3-bedroom houses, and even in bungalows though somewhat large pipes are



Heating. Fig. 3. Solid lines represent simple hot water heating circuit; dotted lines, 1-pipe drop system of hot water heating. T, tank; b, boiler

necessary in the absence of a basement boiler room. The total available pressure seldom exceeds a few ins. of water gauge, of which one in. is roughly equivalent to a pressure of $\frac{1}{2}$ oz. per sq. in.

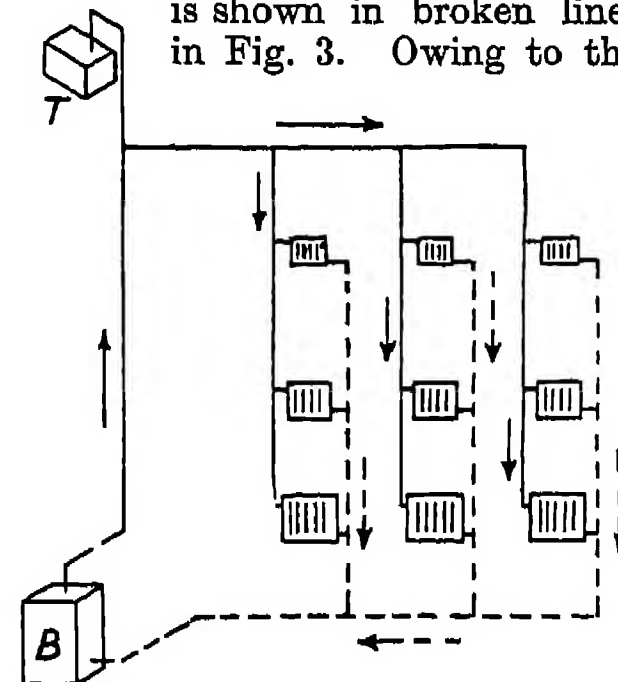
A circulating pump is normally used only in an installation of such size or awkwardness of layout that dependence on gravity would entail the use of unduly large pipes. Acceleration also admits of the use of high-level return pipes, often otherwise impossible, and is necessary in all panel systems using embedded pipe coils. The pump is normally coupled to the main return pipe close to the boiler, about point E in Fig. 3. The term accelerator arises from the practice of designing a scheme with a positive, if not wholly adequate,

gravity circulation via the pump by-pass when the pump is out of use: this is often sufficient overnight and at weekends. Such pumps normally operate against a friction head of from 5 to 15 ft. or more of water column, equivalent to a total pressure of from 2 lb. to 6 lb. per sq. in. The friction head of the pump refers to the sum of the resistances to be encountered and overcome by the moving water, not to the static head, the height to which the pipework extends above the boiler.

A variety of pipework systems is used to connect heating boilers

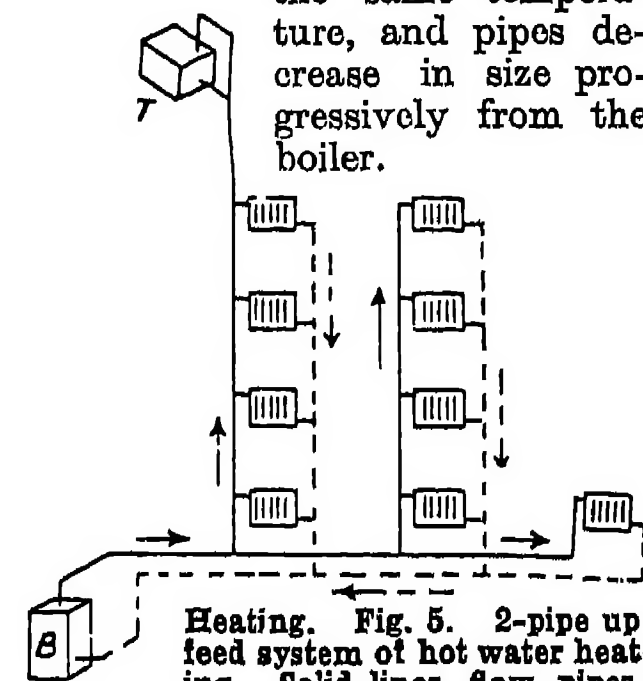
to the heat-dispersing radiators or convectors. The names of these, e.g., 1-pipe, 2-pipe, refer only to the main and branch circuits. In all circumstances, a radiator or other unit must have two connexions, a flow or inlet, and a return or outlet. There is no distinct line between gravity and accelerated circulation in the use and application of the different systems, but, generally, a 2-pipe layout is better suited to the use of a pump than a 1-pipe arrangement.

The four systems in common use are seen in Figs 3 to 6, but irregular combinations of these are not infrequent. The 1-pipe drop system is shown in broken lines in Fig. 3. Owing to the



Heating. Fig. 4. 2-pipe drop system of hot water heating. Solid lines, flow pipes; dotted lines, return pipes. T, tank; B, boiler

progressive cooling of the flow water, by return water from higher radiators, the lower radiators must be proportionately larger, perhaps inconveniently so on the lower floors of a high building. The 2-pipe drop system, Fig. 4, is also seen in miniature in Fig. 1. This is the system par excellence of gravity circulation, eminently adapted to acceleration. All radiators receive flow water at the the same temperature, and pipes decrease in size progressively from the boiler.

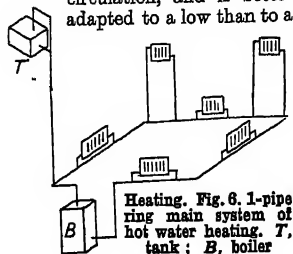


Heating. Fig. 5. 2-pipe up-feed system of hot water heating. Solid lines, flow pipes; dotted lines, return pipes.

The 2-pipe upfeed system, Fig. 5, requires a basement boiler room, and underfloor accommodation for

the main pipes, but it is otherwise similar to other 2-pipe arrangements. The pipework is particularly inconspicuous, and the minimum of overhead pipe-work makes this system the most suitable for a flat-roofed building.

The 1-pipe ring main, Fig. 6, is designed primarily for gravity circulation, and is better adapted to a low than to a



Heating. Fig. 6. 1-pipe ring main system of hot water heating. T, tank; B, boiler

high building. This layout also requires basement space for the boiler and main pipes, and it is subject to the limitations of all 1-pipe systems. A variation of this arrangement is the ladder system in which, referring again to Fig. 3, single horizontal pipes below floor levels would stretch between the verticals AB and CD. Radiators would then be connected to these, and to pipe BC, in the manner of Fig. 6.

The progressive development of space heating has led to the arranging of such installations into three specific groups, namely, central heating, group heating, and district heating, in all of which hot water supply would normally be included.

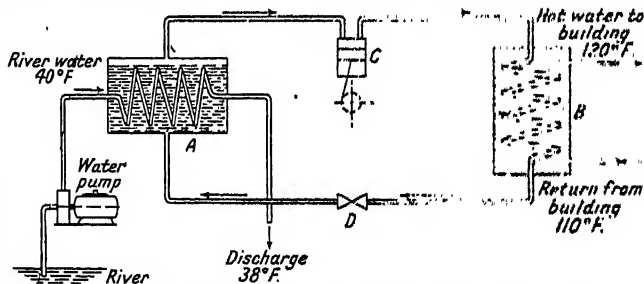
Central Heating

Central heating, originally a generic term, is now correctly applied to installations serving only one building, from a small house or bungalow to a large hotel consuming some millions of heat units per hour.

Group heating refers to the warming of a number of related blocks from a central boiler plant, as in the case of the several buildings of a hospital, a colony of houses, or a number of separate blocks of residential flats or offices. This arrangement ensures greater economy and greater technical efficiency of operation than is normally possible among a number of smaller units.

District heating might be regarded as large scale group heating, in which the premises served comprise the whole of a small town, or the whole of one district of a large town. Projects of this nature supply both domestic and industrial space heating, and much

industrial process heat, and call for thinking in larger terms than has hitherto been customary in space heating. The primary purpose is to conserve national fuel resources by utilising the vast quantities of heat now wasted daily to river water at electricity generating stations, and eliminating the large and growing number of relatively small manually operated boiler plants used for central heating with their varying efficiency and high cost in fuel and labour. In addition to greater thermal efficiency and a higher standard in domestic warmth and comfort, and therefore in health, improved cleanliness of towns, reduced fuel distribution and refuse collection, and less smoke and fog nuisance are among the many advantages of such projects. Existing schemes in Europe and America supply upwards of 10 m. of underground steam and hot water mains to meet loads varying with density of pop. from 2 to 20 therms per hour per acre. It is doubtful whether, in the absence of a thermal grid, district heating would be economically feasible in areas where the development density is below 8 houses per acre. In a normally developed area the cost per week for a 3-bedroom house would be a few shillings.



Heating. Fig. 7. Diagram of heat pump, ABCD, closed circuit containing a readily evaporable liquid refrigerant

The boilers of small heating installations are commonly designed for solid fuel, and are usually of the cast iron sectional pattern. They are normally hand-fired or magazine-fed, and may also be stoked mechanically. Gas and oil firing are also available for all sizes. Larger boilers are used singly and in batteries for both central and group heating, usually with mechanical stoking and full automatic control. Alternatively, gas and oil firing can be used. A range of boilers is often based on more than one method of firing, so that in the event of the failure of one supply, a modified service can be maintained. Electric

thermal-storage is also used in such installations, commonly by immersion heaters up to 100 kW; or electrode boilers in sizes upwards of 50 kW. These normally take current only overnight and during other off-peak demand periods. The space occupied by the large storage cylinders constitutes a heavy overhead charge in highly rated premises.

District Heating

District heating requires the conversion of power stations to thermo-electric stations which generate and distribute both heat and electricity. Heat is generated partly by burning low grade solid fuel, not readily combustible without special grates, and also by utilising the bulk of the steam heat otherwise wasted by condensers to river water. Such conversion improves the thermal efficiency of turbo-generators from the prevailing 20 p.c. to 80 p.c. of the potential heat of the fuel consumed. Current practice distributes both high pressure steam for industrial use, and low pressure steam for domestic services, through closed circuits of heavily lagged underground pipework. The pressure of the steam supplied for industrial purposes can be reduced for space heating of factories; or superheated hot

water can be generated under high pressure for process heating, air-heating batteries, and high-level unit heaters. The low pressure steam is used to heat low pressure hot water in underground heat-exchangers. From these, hot water main and branch circuits are laid to supply each house with space heating through a radiator system, and hot water supply by means of an indirect cylinder.

An interesting source of heat suitable for radiant space heating, and other low temperature services such as swimming baths, known as the "heat pump," is shown diagrammatically in Fig. 7.

The principle (enunciated by Kelvin in the mid-19th cent., uses a reversed refrigeration cycle, by which heat from a low temperature source such as river or lake water is raised to a more useful high temperature. The cycle of operation is as follows: on the suction stroke a compressor C, which may be driven electrically, or by diesel engine, steam or water power, reduces the pressure in the evaporator A to such an extent that the liquid refrigerant is made to boil and evaporate by the river water passing through the coil. On the compression stroke the refrigerant vapour in the cylinder of C is so compressed that the temperature of the vapour is raised through, perhaps, 200° F. This same stroke forces hot vapour through the coil in the condenser B, in which the vapour is again condensed to a liquid by reason of the heat it gives up to the relatively cool building heating water circulating through the outer container. Another suction stroke then draws the liquefied refrigerant through the expansion valve D at a reduced pressure, whence it passes to A to complete and repeat the cycle.

The advantage of the heat pump is that the output of heat from D, *i.e.* the heat supplied for use, may be upwards of three times the heat equivalent of the mechanical power used to drive the compressor. This ratio, output over input, is greatest in serving a low temperature demand such as that of a swimming pool, but it averages from 2½ to 3 times the input for radiant space heating.

Large installations of this kind are in use in Switzerland and the U.S.A.; and a full scale heat pump installation used for space heating at Norwich supplies approx. 4 millions B.Th.U. per day to a building of 500,000 cu. ft. capacity, and shows a co-efficient of performance of 2.8 under test.

Heaton. Common topographic term in the Manchester dist., S.E. Lancs, England. Heaton Norris, Heaton Mersey, Heaton Chapel, Heaton Moor, all lie S.E. of Manchester near the Mersey, and are interested in the cotton industry. Heaton Norris (pop. 10,846), the largest of these places, is a town and parish separated from Stockport only by the Mersey, here traversed by a railway viaduct and by other bridges. Heaton Park, area 1 sq. m. due N. of Manchester, in Prestwich parish, formerly the seat of the earls of Wilton, was bought by the Manchester

Corporation in 1902, and the fine stone mansion now houses collections of pictures and Oriental arms and armour.

Heaton is also the name of an industrial district of Newcastle-upon-Tyne, with its own railway station.

Heaton, Sir John Henniker (1848–1914). British postal reformer. Born at Rochester, and educated at King's College, London, he was Conservative M.P. for Canterbury, 1885–1910, and was created a baronet in 1912. He had large interests in Australia and, though never holding an official position in the government, he accomplished, as a private member, universal penny postage for letters within the British Empire, 1898, penny postage between the U.S.A. and the U.K., 1908, money orders by telegraph in Great Britain, and a parcel post to France. He died Sept. 8, 1914.

Heat Stroke. Illness resulting from failure of the mechanism governing heat production and heat loss, accompanied by dilatation of the surface blood vessels with dehydration from sweating. It is commonest in Europeans working in tropical conditions directly exposed to the rays of the sun. Preventive measures against heat stroke are used in the tropics; work is done where possible in shade, but the old-fashioned heavy topee is now rarely worn, and the spine pad is completely discarded as being indeed a source of trouble. Heat stroke and sunstroke are allied conditions. Treatment consists of laying the patient in a darkened cool room, giving fluids and salt to replace those sweated out, applying ice to the head and neck, and stimulating the action of the heart.

Heat Wave. Term popularly applied to a spell of hot weather. During summer the eastern states of the U.S.A. are occasionally invaded by streams of air heated and moistened by contact for hundreds of miles with the warm waters of the Gulf Stream. As the associated depressions in the rear of the warm air move sluggishly, or even remain stationary for days, temperatures rise steadily. The combination of heat and humidity may produce unbearable conditions in great cities. Temperatures sometimes exceed 100° F. in New York; the nights are sultry and there is little relief until the centre of the depression has passed and the wind swings N. The heat and drought, if prolonged, may be serious for agriculture.

The limit of discomfort which the human body can endure depends much more upon the degree of moisture present and the rate of movement than the actual temperature of the air. While the skin may be considerably cooled, by evaporation, etc., below the air (*i.e.* dry bulb) temperature, it can never be below that of the wet bulb. A decrease in humidity or an increase in wind lowers the wet bulb temperature and makes conditions more tolerable. During heat waves in American cities wet bulb readings about 85° F. are registered.

In the so-called London heat waves the wet bulb temperature does not exceed 75° F., but the dry bulb may on rare occasions, *e.g.* the end of July, 1943, and the opening of June, 1947, reach the nineties. On six successive days beginning May 29, and on four beginning Aug. 15, 1947, the London temperature exceeded 86° F. Heat waves in the British Isles often result from S. or S.E. indraughts of warm air, caused by an anticyclone lying across W. or middle Europe at the same time as a depression is more or less stationary over the Atlantic. See Humidity; Temperature.

Heave. Geological term used in connexion with faults (*q.v.*), signifying the horizontal component, measured at right angles to the strike, of the relative displacement (*i.e.* the slip), along the fault-plane.

Heaven. Dwelling place assigned to God and His angels, and to the blessed departed spirits. Belief in a future life is found in most primitive religions. It assumes various forms, some of which are inconsistent with the idea of a happy state after death, or of one which is appreciably better than the present. Many primitive conceptions of the future life represent it as essentially inferior to the present. Among such beliefs may be noted specially the conviction that the spirits of the dead linger round the scenes of their earthly existence, and the conception of transmigration according to which the soul of the departed enters into another human or animal body.

At this early stage of religious development the prevailing notion is that the life beyond the grave bears a close resemblance to the present life, and that the departed continue their avocations in similar though perhaps improved conditions. The entrance to the world of the blessed depends upon the favour of the gods, which is earned

by a due fulfilment of the religious rites and customs of the tribe. A striking illustration of the belief that the future life is a continuation of the present is the common custom of burying implements and weapons with the corpse.

Among the national religions the Egyptian laid great stress upon the life beyond the grave. An ethical development may be observed in the conditions required for admission to the abode of the blessed. Moral purity is regarded as essential in the higher forms of Egyptian religion. The Greek and Roman religion did not develop the idea of a happy life beyond the grave to anything like the same extent. The thought is not, however, entirely absent, and it played a considerable part in the so-called "mystery religions." The prevailing view is nevertheless that the life beyond the grave is merely a feeble and shadowy copy of the present world. Only certain heroes specially favoured by the gods are supposed to enjoy happiness in an earthly Elysium. Philosophical ideas of immortality were developed by Pythagoras, Plato, Aristotle, and other thinkers.

Eastern Conceptions

The religions of the East have made the idea more prominent, and both Hinduism and Buddhism have evolved complex doctrines of the hereafter. According to the Buddhist theology the state of final blessedness consists in Nirvana, which involves the loss of individual existence. Thus the complete attainment of salvation would raise the soul above heaven. Pious people who have not yet attained this final blessedness are rewarded by re-birth in one of the numerous heavens. The highest heaven is a condition in which desire and pleasure have no place.

Mahomedanism offers a very different conception of heaven. The Koran teaches the resurrection of the body and represents the beatitude of the faithful as consisting of enjoyments of a sensual character. The crudity of this view has, however, been modified by the more mystical schools of Mahomedan thought.

In the O.T. the word heaven is used to signify the sky, which is regarded as the roof of the world and also as the dwelling-place of God. The idea of a reward for the righteous after death is not prominent in Hebrew religion, and is only found in the later books. The prevailing belief was that the divine Providence metes out rewards and punishments in this life. Some of the most interesting passages in Hebrew literature are pro-

tests against this view, cf. the book of Job. In later Jewish literature, and particularly in the so-called Apocalyptic writings, the idea of a resurrection and a future life becomes very prominent, though it assumes somewhat fantastic forms.

The New Testament and Heaven

In the N.T. heaven is, as in the O.T., the dwelling-place of God, as we are reminded by the opening words of the Lord's Prayer. It is also represented by the writers of the Epistles and the Revelation as the abode of the ascended Christ. Heaven is also the final home of the righteous. This is a part of the teaching of Jesus and of the apostolic writers. Several passages suggest that there is more than one heaven. It is possible that this is implied in Christ's saying about "many mansions." S. Paul speaks of being caught up into the third heaven (2 Cor. xii, 2). In the Epistle to the Hebrews Christ is said to have "passed through the heavens" (Heb. iv, 14).

No definite statements are to be found in the N.T. on the nature of heaven and the life of the righteous in the world to come beyond the assertion of general principles. The language of the Revelation of S. John must not be interpreted as a literal description of heaven. The Christian conception of heaven is social. It is described as a kingdom and involves intercourse. It is, however, not a decrease of life, but an increase, since the state of the blessed is called "eternal life."

The joy of heaven, in the Christian view, is spiritual and not material. Jesus was careful to point out that the relations which are based on bodily functions are not carried over as such into the heavenly kingdom. It consists in the unimpeded exercise of moral and spiritual activities. Thus the desire for truth and understanding cannot, in the nature of things, be fully satisfied in the present order, and the life of heaven is conceived as one of fuller knowledge as contrasted with knowledge "in part." Another element in the joy of heaven is the fuller development of fellowship with others and of the possibilities of love. For Christianity, however, the supreme good and the final reward is perfect communion with God, or the Beatific Vision. Thus the life of heaven is to be thought of as the complete attainment of an eternal life which can be possessed partially in the present life.

Several philosophical problems have been raised in connexion with the idea of heaven. Such is the question whether heaven can be described as a "place." There are

obvious difficulties in supposing that heaven occupies a portion of space, and a common answer is that "Heaven is not a place but a state." This solution is not entirely satisfactory, because it is not easy to see how individual existence can be preserved if the future life is not accompanied by conditions analogous to those of space. The scientific and philosophical conceptions of space are now the subject of much discussion, and it is possible that new light may be thrown upon the future life.

W. R. Matthews, K.C.V.O., D.D.

Bibliography. Christian Doctrine of Immortality, S. D. F. Salmond, 1901; Human Personality and its Survival of Bodily Death, F. W. H. Myers, 1903; Immortality, ed. B. H. Streeter, 1917; The Hope of Immortality, W. R. Matthews, 1937.

Heaviside, Oliver (1850-1925). British scientist, born in London, May 13, 1850. He was employed by the Great Northern Telegraph company until deafness caused him to retire in 1874. In Devon he devoted himself to theoretical investigations in electricity, publishing the results in 1892 as *Electrical Papers*. In these he dealt with electrostatic and electromagnetic induction between parallel wires, the high frequency resistance and inductance of a concentric main and quadruplex and multiplex telegraphy. His practical work made the long distance telephone possible. In 1893 his *Electro-Magnetic Theory*, 2 vols., postulated the presence of an ionised layer (E.S.) in the upper atmosphere. Heaviside was elected F.R.S. in 1891, and died at Torquay, Feb. 4, 1925.

Heaviside Layer. Layer of electrically charged particles in the upper atmosphere, several hundred kilometres above the earth's surface. The presence of this conducting layer was suggested by Oliver Heaviside (E.S.) to account for the long range propagation of radio waves around the earth, the layer acting as a reflector. The height and degree of ionisation, i.e. the number of charged particles per unit volume, vary hourly and show a marked dependence on sunspot activity and so-called magnetic storms. Another name is Kennelly-Heaviside layer. See Appleton Layer; Radio.

Heavy Hydrogen. The existence of two isotopes of hydrogen, in addition to the familiar element, has been reported. These isotopes have been prepared or isolated by the evaporation of liquid hydrogen

and by the electrolysis of heavy water. The isotope with the atomic or isotopic weight of 2 *plus* has been named deu'terium or diplogen; ordinary hydrogen may contain as much as 1 part in 5,000 of deuterium. The isotope with the atomic or isotopic weight of 3 has been named tritium, ordinary hydrogen containing a much smaller proportion of this than of deuterium. See Deuterium; Heavy Water.

Heavy Water. Name given to water which contains about 99 p.c. deuterium oxide (D_2O), an isotope of hydrogen with an atomic weight of 2.0136. Heavy water has a specific gravity of 1.1, freezing point $3.82^\circ C.$, and boiling point $101.42^\circ C.$ Ordinary water contains a small proportion of deuterium oxide, and the relative abundance of the different isotopes (that is to say $^1H: ^2H=6900: 1$ and $^{16}O: ^{18}O: ^{17}O=506: 1: 0.2$) is found to be very constant.

Heavy water can be obtained by electrolysis of weak sodium hydroxide solution, followed by concentration until the water has a density of 1.1 and contains about 99 p.c. D_2O . It has been used to trace chemical actions, especially those taking place in the metabolism of animals. See Deuterium; Heavy Hydrogen.

Heavyweight. Term applied particularly to boxers in the "unlimited" class; heavyweight champions may be of any weight. The first world heavyweight champion under recognized rules was the American James J. Corbett in 1892; the only Englishman to gain the title was Bob Fitzsimons in 1897. There is also a light-heavyweight or cruiser class for those of 12 st. 7 lb. or under. Similar divisions apply to wrestling. See Boxing.

Hebbel, CHRISTIAN FRIEDRICH (1813-63). German dramatist and poet. He was born at Wesselburen, Holstein, March 18, 1813, the son of a mason. He studied at Hamburg, Heidelberg, and Munich, and in 1842 his first tragedy, *Judith*, brought him immediate fame. It was followed by *Maria Magdalena*, 1844, the best of his earlier plays, and a forerunner of the naturalistic drama.

His later plays included *Herodes und Mariamme*, 1851; *Gyges und sein Ring*, 1855; and the trilogy, *Die Nibelungen*, 1862, the two last named being his masterpieces. He also published two volumes of poems, 1842 and 1848. Hebbel died in Vienna, Dec. 13, 1863. His *Tagelücher* (Diaries) were

issued in 1887. A study by E. Purdie appeared in 1932.

Hebburn. Urban district and industrial town of Durham, England. It stands on the right bank of the Tyne a mile W. of Jarrow. The council maintains a public park, playing fields, etc. The town has shipbuilding yards, electrical and general engineering works, steelworks, paint factories, and coke-making plant. Near by are coalmines. Pop. (1951) 23,098.

Hebden Bridge. Town of Yorkshire (W.R.), England, part of the urban district of Hebden Royd. It stands on the Hebden and Calder rivers, 8 m. W.N.W. of Halifax. Hardcastle Crags, a favourite resort, are 3 m. to the N.W. Manufacture of ready-made clothing is the chief industry; and there are dyeworks, foundries, chicken hatcheries, and a portable-building factory. Pop. of urb. dist. (1951) 10,232.

Hebdomadal Council (Gr. *hebdomos*, seventh). In the university of Oxford, a board dating from 1631 which holds weekly meetings to discuss matters affecting the government of the university, and submit business to convocation or congregation. It is composed of the chancellor, vice-chancellor, and proctors, *ex officio*, and of 18 other members of the university, elected by congregation, and sitting for six years. See Oxford University.

Hēbē (Gr., youth). In Greek mythology, the goddess of youth. She was the daughter of Zeus and Hera, and was given in marriage to Heracles when he became a god.

She was the cup-bearer of the gods before Ganymede (*q.v.*). Her Roman counterpart was Juventas. See Canova.

Heber, REGINALD (1783-1826). British prelate and hymn-writer. He was born April 21, 1783, at



After T. Phillips

Malpas, Cheshire, where his father was rector, and educated at Brasenose, Oxford. He won a prize for English verse with his poem, *Palistine*, 1803. Having married a daughter

of Dr. Shipley, dean of St. Asaph, he became incumbent of Hodnet. He was Bampton lecturer, 1815; preacher at Lincoln's Inn, 1822; and second bishop of Calcutta, 1822-26. He died April 3, 1826, at Trichinopoly. Heber edited the works of Jeremy Taylor, 1822, and wrote many hymns, including *Holy, Holy, Holy*, and *From Greenland's Icy Mountains*.

Hébert, JACQUES RENÉ (1757-94). French Revolutionary. Born at Alençon, Nov. 15, 1757, as a young man he worked in Paris as theatrical manager and doctor's assistant. He became known by his conduct of the journal *Le Père Duchesne*. His arrest was ordered in May, 1793, but popular demonstrations in Paris forced his release. Hébert instituted the so-called cult of the goddess of Reason. He was guillotined March 24, 1794.

HEBREW LANGUAGE, LITERATURE, AND RELIGION

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The article supplements the historical sketch of the Jews. See articles on Jerusalem, Palestine, and various other places and countries associated with this people. See also Alphabet; Bible; Old Testament; the articles on the books of the O.T.; and those on the great Hebrews, e.g. Abraham, Moses, etc. See also Jehovah

Hebrew belongs to the Middle Semitic or Canaanitish branch of the Semitic languages, and is related closely to Arabic (S. Semitic), Aramaic (N. Semitic), and Babylonian (E. Semitic). The term Hebrew, originally a gentile, derived from a word meaning "country on the other side," was applied by neighbouring peoples to the people "on the other side," i.e. of the Jordan, or more probably of the Euphrates. Whatever the precise origin of the language, it developed in Canaan, and in Isaiah 19, v.18, is described as "the language of Canaan." Elsewhere in the O.T. it is referred to, not as

the Hebrew language, but as "the Jews' language."

Hebrew is written from right to left. The old character resembles the Phoenician. This was exchanged about the 4th century for the "square character" of Hebrew bibles. Originally Hebrew writing consisted only of consonants, as still in the Synagogue scrolls of the Law. The system of vowel-signs was introduced by the Masoretes in the 7th century to preserve traditional pronunciation (*masora*, "tradition").

The grammatical structure of the language presents curious characteristics in common with the

other Semitic languages. Word-stems are mostly trilateral, and compounds are very rare. The verb has only two tense-forms, which express the state rather than the time of an action. The noun has only two genders, masculine and feminine, neuter ideas being expressed by the latter. Nor has it any cases in the Greek and Latin sense. These are expressed partly by prepositions. There is a comparative scarcity of adjectives, which is compensated for by an idiomatic use of nouns (e.g. "son of death"—worthy of death). Syntactical relations are expressed very simply. In fact, it is characteristic of the purest Hebrew that the clauses are short and simple. The poetry is distinguished from the prose, not by rhyme (which is avoided), but by rhythm.

Outside the O.T. only a few examples of the old Hebrew or old Canaanitish literature have survived. In particular, we have a number of Canaanite glosses in the Tell el-Amarna Tablets (c. 1400 B.C.), an inscription of Mesha, king of Moab (c. 850 B.C.), commonly known as the Inscription of Mesha, or as the Moabite Stone, and the 8th century Hebrew inscription, usually described as the Siloam Inscription because it was discovered on the wall of the Pool of Siloam at Jerusalem. The language of all these is related closely to the language of the O.T. In the O.T. itself reference is made to several ancient writings, more of the nature of books, which were used as sources.

Early Poetical Fragments

The most ancient of these, fragments of which are preserved in the O.T., were poetical. They seem to have been collections of ballads and songs celebrating great events and exploits. Special mention is made of the Book of Jasher (Josh. x, 13; 2 Sam. i, 18) and the Book of the Wars of Jehovah (Num. xxi, 14, 15). From such collections no doubt were drawn fragments like the Song of the Well (Num. xxi, 17, 18) and the Song of Deborah (Judges v). Mention is made also of early prose records, such as the Book of the Acts of Solomon (1 Kings xi, 41), the Book of the Chronicles of the Kings of Israel (1 Kings), and the Book of the Chronicles of the Kings of Judah (1 Kings). There were also collections of wise sayings (Proverbs xxiv, 23).

Between the earliest (c. 1200-1000 B.C.) and latest portions (c. 150 B.C.) of the O.T., or between the Exilic and Post-Exilic writings which together comprise Biblical Hebrew, there is a marked dif-

ference in style. After the Fall of Samaria in 721 B.C., and still more after the Fall of Jerusalem in 586 B.C., Aramaic, the spoken language of the population that surrounded the Jews, made gradual but persistent encroachments upon Hebrew. If the language was spoken still and understood by the people in the time of Nehemiah (5th century B.C.; Neh. xiii, 24) and of the rise and development of the Synagogue (430-330 B.C.), it had lost much of its purity.

Aramaic Influence

The literature from the time of the Exile to the Maccabean period (c. 160 B.C.) shows more and more in style and vocabulary the overpowering influence of the official language of the western half of the Persian Empire (Aramaic). But

Form	Equivalent	Name	Signification
א	'	Aleph	Ox
ב	b, bh	Beth	House
ג	g, gh	Gimel	Camel
ד	d, dh	Daleth	Door
ה	h	He	Window
ו	v	Vau	Hook
ז	z	Zain	Weapon
ח	ch	Cheth	Fence
ט	t	Teth	Snake
י	y	Jod	Hand
כ	k, kh	Caph	Bended hand
ל	l	Lamed	Ox goad
מ	m	Mem	Water
נ	n	Nun	Fish
ס	s	Samech	Prop
ע	'	*Ain	Eye
פ	p, ph	Pe	Mouth
צ	ts	Tsaddi	Fish hook
ק	q	Koph	Back of the Head
ר	r	Resh	Head
ש	sh or s	Schin	Tooth
ת	t, th	Tau	Cross

Hebrew Language. The Alphabet

popular works seem to have been written as late as 50 B.C. (e.g. the Book of Judith).

Hebrew, therefore, can hardly be said to have been dead long before the time of Christ, though by that time Aramaic had become the spoken language. We witness the last phases of the struggle between Hebrew and Aramaic on the one hand and Hebrew and Greek on the other in some of the latest books of the O.T. and in some of the books of the Apocrypha. The book of Ezra (between 300 and 250 B.C.) and the book of Daniel (c. 164 B.C.) are partly in Aramaic.

The book of Ecclesiastics (O.T. Apocrypha), composed about 200 B.C., was written in Hebrew, though much of it has survived only in Greek and other versions. It is significant that in order to make this work better known to Jews, it was translated into Greek in 132 B.C. by the author's grandson, who tells us in a prologue that the task of translating Hebrew into Greek already presented difficulties. Again, whereas the first book of Maccabees (O.T. Apocrypha), composed about 125 B.C., though preserved only in Greek and other versions, was written originally in Hebrew, the second book of Maccabees (O.T. Apocrypha), composed between the years 80 B.C. and A.D. 1, was written from the first, like most of the other books of the O.T. Apocrypha, in Greek.

If a number of the works known as Pseudepigrapha, a body of literature written under assumed names between 180 B.C. and A.D. 100, were composed in Hebrew, the reason was to give them, in addition to the prestige of a famous name, the further authority and sanctity of the sacred tongue, regardless of the fact that this was understood no longer by the bulk of the people.

Origin of Targums

Long before the time of Christ it had become necessary, even in the synagogues, to explain the language of the sacred writings. This was done by an official interpreter known as *Targuman* or *Methurgaman*. At a later date these translations were committed to writing and received the name *Targum*.

In the countries of the Dispersion, of course, Hebrew would be forgotten sooner than in Palestine. As early as the 5th century B.C. Jews went to Egypt; others followed under Alexander the Great and the Ptolemies, forming important colonies. Consequently, long before books had ceased to be written in Hebrew in Palestine, part of the O.T. had to be translated into Greek for the sake of the Greek-speaking Jews of Alexandria. The beginning seems to have been made in the reign of Ptolemy Philadelphus (284-247 B.C.).

Before the end of the 2nd century B.C. the larger portion of the O.T. existed in Greek. The spread of the Greek language involved also the spread of Greek civilization. There arose and developed, not only in Alexandria and elsewhere, but even in Palestine, an important Jewish-Hellenistic literature. The authors of some of the O.T. Apocrypha (e.g. the Book of Wisdom) and of the Pseudepigrapha (e.g. the Book of the Secrets

of Enoch) were Alexandrians; but the chief Jewish-Hellenistic writers were Philo of Alexandria and Josephus of Jerusalem.

Philo seems to have been born between 30 and 20 B.C., and to have died between A.D. 45 and 50. Among other works he wrote a *Life of Moses* and a history of the persecutions endured by the Jews in his own time, of which only part has been preserved. The treatise *On the Contemplative Life*, ascribed to him, perhaps belongs rather to the 3rd or 4th century A.D. Josephus, the Jewish historian, who was born A.D. 37-38 and died about 100, completed his book on the Wars of the Jews before 79, and wrote his *Antiquities* and his *Reply to Apion* about or soon after 93-94.

After the destruction of Jerusalem in A.D. 70 a reaction against the use of Greek set in. When all else was lost, the sacred writings and the sacred language assumed a new sanctity. Hebrew was resuscitated and developed, not indeed as a popular speech, but as the language of books and scholars. Hence arose Post-Biblical or Talmudic Hebrew.

Books of the Law

The Hebrew law (the *Torah*) became the text for numerous comments and legal discussions by the Jewish rabbis. These pronouncements at first constituted an oral tradition; afterwards (c. A.D. 200) they were written down and incorporated, probably by pupils of Shammai and Hillel, in the *Mishnah*, a work that forms the basis of the larger work known as the *Talmud* (*q.v.*).

Closely related to these discussions is a branch of literature which consists of commentaries on the sacred text, called *Midrashim* (singular, *Midrash*). The earliest of these belong to the 2nd century A.D. The Talmudists (2nd-5th centuries) were succeeded by the Masoretes (5th-8th centuries), the Jewish scholars who fixed the text of the O.T.

Another revival of Hebrew took place about the 10th century. There arose, in emulation of the Arab grammarians, a notable school of Hebrew grammarians and exegetes. Representatives of this school include Saadia of the Fayûm (892-942), Rashi (1040-1105), Aben-Ezra (1088-1167), Moses Maimonides (1135-1204), and David Kimchi (1160-1240). The language used is a new development, and is even less pure than Talmudic Hebrew. It is known as New Hebrew or Rabbinic Hebrew (not to be confused with Yiddish). Aben-Ezra was also a poet whose name recalls the fact that the 10th cen-

tury saw the rise, especially in Spain, of a rather remarkable school of New Hebrew poets.

The beginning of the 18th century brought another renaissance in Hebrew letters, which started in Italy with the activities of M. H. Luzzatto, philosopher, poet, and dramatist. The movement spread to Germany, which in course of time became its centre (the so-called Haskalah period, c. 1750-1850). Then, in the early part of the 19th century, the centre of activity was transferred to Galicia (the Galician period).

By the middle of the 19th century the lead was taken by Russia, which produced such famous writers as Abraham Mapu (1808-67), a creator of the Hebrew novel, Judah Loeb Gordon (1831-92), the poet, Peretz Ben Moshe Smolenskin (1839-84), the essayist and novelist, and Constantine A. Shapiro (1840-1900), the poet. More recently poets like H. N. Bialik, Saul Tschernihovsky, Jacob Cohen, and Z. Schneer have greatly enriched the storehouse of Hebrew literature. The language of the modern writers, popularly known as Modern Hebrew, aims at keeping as close to the classical model as possible.

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HEBREW RELIGION. This claims exceptional consideration as the parent of two other great and world-wide monotheistic faiths, Mahomedanism and Christianity. Its wonderful development was not quite an ordinary evolution, because in a special degree it was carried from one stage to another by a series of great men who appeared suddenly as leaders and prophets. Among the patriarchs an outstanding figure is that of Abraham, who is said to have led a migration of certain nomadic tribes from Mesopotamia (Ur of the Chaldees) to Palestine; and there is a persistent tradition that Abraham was spiritually the father of Israel. It has even been suggested that the migration of Abraham was due essentially to a religious impulse; it

was a protest against degeneration in the Babylonian moon-worship, or against the polytheism cultivated in Babylonia by the Hammurabi dynasty (so Jeremias).

Moses, however, was the first prophet, and the founder of the Hebrew religion. At first the migrating tribes seem to have shared the beliefs of other Semitic nomads. They believed in powerful demons or spirits which inhabited stones (the sacred stone of Bethel, Gen. xxviii, 22), trees (the sacred oracular tree at Shechem, Gen. xii, 6; Deut. xii, 3), springs (the sacred wells at Kadesh, Gen. xiv, 7, and at Beersheba, Gen. xxi, 28-30, 31), and even animals (the brazen serpent, Nehushtan, Num. xxi, 4-9; 2 Kings xviii, 4). Natural boulders were used for altars, and sacrifices were not prominent. Where blood was shed, it was for the most part used for blood-covenants.

In Egypt the Hebrew tribes do not seem to have been much impressed or affected by the more developed religion which they found there. But here a leader arose, who had clearly been uplifted and inspired by stirring religious experiences (Exod. iii, 2-4). It is possible, as Jeremias has suggested, that, when Moses fled from the court of Egypt into Midian, where he became a shepherd in the service of Reuel or Jethro, the priest of the Midianites, he did so because on religious grounds he had become unpopular at the Egyptian court. In any case, if he was seeking a fresh religious stimulus, he would seem to have found it among the Midianites.

Recent research indicates that before Yahweh (Jehovah) was proclaimed by Moses the covenant God of Israel, he had long been a tribal deity of the Kenite-Midianites. Moses founded the priesthood, being himself both prophet and priest. Inspired by Yahweh (Exod. xx), he gave the people ten simple commandments. The sanctuary of Yahweh was a sacred ark, probably an ancient object which had acquired a new significance.

At this stage the religion may be described as monolatry. Yahweh is the one officially recognized God of Israel, but he is not the only God. In Canaan the Hebrews met with a rather elaborate Canaanite cultus. This in course of time they appropriated in large measure. Sacred shrines and fixed altars were taken over for the use of Yahweh. The sacrificial system and the agricultural festivals of the Canaanites were adopted. Sacrifices are now regarded for the most part as gifts, and special importance is attached to first fruits. Three times in the year all the males in Israel are

commanded by Moses to appear before Yahweh—at the Matssoth Festival or Feast of Unleavened Bread, at the Feast of Weeks or Harvest Festival, and at the Vintage or Feast of Tabernacles; all were originally agricultural festivals (Exod. xxxiv, 14-26).

The rise of a priesthood was inevitable. This was hereditary. An early example of the teaching of the priests is provided by the Book of the Covenant (Exod. xxi, 1-xxiii, 13). The cultus, of course, was not yet centralized. Yahweh was identified with the local Baals of the Canaanites, and Bethel, Gilgal, Dan, and Beersheba appear as favourite places of pilgrimage. At about the time of the institution of the monarchy we hear of a body called the "sons of the prophets." These seem to have constituted a prophetic guild or fraternity, the members of which were able to arouse in themselves and others great religious enthusiasm (1 Sam. xix, 20).

They were organized by Samuel, called the seer of Ramah; and with them the prophets have emerged as a power to be reckoned with. In the reigns of Ahab of Israel (876-854 B.C.) and Jehoshaphat of Israel (873-849 B.C.), in the persons of Elijah and Elisha the prophets begin to assume an active and commanding rôle as religious and social reformers. Hebrew religion now begins to lay stress on ethics rather than on ritual. With the emergence of the great prophets, we arrive at a development of Hebrew religion which may be described as monotheism.

Monotheism of Early Faith

The earlier religion tolerated other deities; the prophetic religion does not. In spite of the curious and doubtful phenomenon presented by the Egyptian king Amenophis IV or Akhenaton, this ethical monotheism is the distinguishing feature of early Hebrew religion. The prophets wished to purge the religion of all heathen contamination. They opposed strenuously the sacrificial cultus, and proclaimed that Yahweh takes no pleasure in sacrificial feasts (Amos v, 21-24, iv, 4; Hos. vi, 4-6; Isa. i, 10-17; Jer. vi, 20). They rejected the use of an image as a representation of God (Hos. viii, 4-6, x, 5, xii, 2). They even denied the superiority of the Israelites. The dark-skinned Ethiopians are just as dear to Yahweh as the children of Israel. Amos found cherished among the people a well-established doctrine of the Day of Yahweh as a day when Yahweh would make them triumphant over all their enemies. He transformed it so

radically and ethically that "instead of Israel triumphing over her enemies on that day, she is herself to be humiliated, and that by Yahweh himself." (See Amos and Hosea, p. 131, W. R. Harper, 1905, in *Int. Crit. Comment.*)

The eighth century prophets exercised a very great influence on the Hebrew religion; but they were idealists, and the immediate circles of their influence were not large. In the reign of Manasseh (686-641 B.C.) there was a religious reaction during which old superstitions were revived and new cults were imported. The prophetic party had to wait patiently for a new opportunity. In the meantime they drew up a new ethical code, the Deuteronomic law (roughly equivalent to Deut. v-xxvi, and xxviii). When the inevitable counter-reaction came in the reign of Josiah, this code was produced and made the basis of a great religious reform (621 B.C.). Various heathen superstitions were discarded, local sanctuaries were abolished, and the cult was centralized in Jerusalem.

Jeremiah and Isaiah

Peake points out that in the author or authors of the new code the priest and the prophet have met. An interest is shown in the externals of religion which was foreign to the great prophets of the 8th century. At the same time, in the spirit of the prophets, a striking humanitarianism is displayed, and "love of others is made secondary only to the love of God." The prophet Jeremiah, whose call had come in the thirteenth year of the reign of Josiah (627 B.C.), substituted individualism for nationalism in religion, and emphasised the inwardness of religion (Jer. xxxi, 31-34). The prophet known as Deutero-Isaiah developed universalism. Yahweh wills the salvation of the whole world (Isa. xlii, 1-6, xlix, 6, lii, 10). And Israel is the "Servant of Yahweh," the vicarious sufferer for the sins of all the nations, who by her sufferings makes Yahweh known to the world.

Here we reach what is perhaps the high-water mark of Hebrew religion, but it was too high an ideal. Ezekiel, who was a priest as well as a prophet, understood the limitations of human nature better, and was able to effect a compromise. He was one of the exiles taken to Babylonia in 597 B.C. A disciple of Jeremiah, he reinforced his teaching there (from 592 B.C.); and then, after the capture of Jerusalem and the destruction of the temple in 586 B.C., comforted himself with visions of a restoration of a Hebrew state in

Palestine. To Ezekiel ceremonial and ritual seemed essential, and the direction of the new development represented by the Law of Holiness (about 500 B.C.), and the reform of Nehemiah (about 444 B.C.), had been determined by the activity of Ezekiel.

Day of Atonement

When the cultus was centralized at the rebuilt temple of Jerusalem, the old connexion of the festivals with agriculture was severed, and they were transformed into memorials of historical events. Moreover, a new yearly festival was added, the Day of Atonement (Lev. xvi). A special official class now becomes necessary, a higher order of priests (in contrast to a lower order, the Levites), with a high priest at the head of them (Lev. xxi, 10; Zech. iii, 8).

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Hebrews, EPISTLE TO THE. One of the canonical books of the N.T. In the English version it bears the title The Epistle of Paul the Apostle to the Hebrews. In the epistle itself, however, there is no claim to any particular authorship, and in the oldest MSS. the superscription is simply "to Hebrews." The epistle is less like a letter and more like a treatise than any other of the N.T. epistles. It can hardly have been written by S. Paul, since it differs radically in language, style, and thought from the other Pauline writings.

The epistle is not included in the Canon of Marcion or in the Muratorian Canon, but it is quoted by Clement of Rome. Clement of Alexandria states that it was written by S. Paul in Hebrew and translated by S. Luke into Greek. Hippolytus and Irenaeus were acquainted with it, but they do not accept the Pauline authorship. The "Hebrews" seem to have been a Jewish Christian community, and most probably they were a section of the Church in Rome.

The use made of the O.T. by the writer suggests that his purpose was to save his readers from a relapse into Judaism. The epistle is, in fact, as Prof. Peake says (*Crit. Intro. to the N.T.*, 1900), "an elaborate many-sided demonstration that Judaism is inferior to Christianity." It would seem to have been written towards the end of the 1st century A.D.

Hebrews, GOSPEL ACCORDING TO THE. One of the more important of the N.T. Apocrypha (*q.v.*), which has survived only in fragments found in writings of the Fathers of the Church. It seems to have been written originally in Aramaic, and to have been intended for the Jewish Christian congregations of Palestine. According to Harnack, it was composed between A.D. 65 and 100. As one of the sources for a life of Jesus, it is ranked by O. Holtzmann (*Life of Jesus*, 1904) with the gospel of S. John.

Hebrides. A large group of islands lying off the W. coast of Scotland. They are usually divided into the Inner and Outer Hebrides, which is descriptive of their position in regard to the mainland. The two groups are separated from each other by the Little Minch, which is about 12 m. across in the narrowest part. The Inner Hebrides include Skye, Mull, Islay, Jura, Colonsay, Tiree, Coll, and some smaller ones, Eigg, Rum, Conna, Staffa, and Iona; also S. Rona, Raasay, Oronsay. These are known to the geologists as the trap islands, as they are composed of basaltic or trap rocks. On Mull is Ben More, the highest point in the group. The Outer Hebrides form a continuous series of islands extending for about 120 m. The largest is Lewis-with-Harris; others are N. and S. Uist, Benbecula, Barra, Scarpa, Eriskay, and Taransay. These are gneiss islands. The outermost member of the group is St. Kilda, 40 m. W. of N. Uist; the Flannan Islands are an isolated group W. of Harris.

The islands number in all over 500, but only about 100 are inhabited, and many are simply islets of bare rock. They fall within the counties of Ross and Cromarty, Inverness, and Argyll. Rainfall averages high throughout the Hebrides, but on the whole the climate is mild and pleasant. In most parts the soil is sparse and agriculture is difficult, but fair quantities of oats, barley, and potatoes are grown on the crofts. Sheep-rearing and fisheries are the staple industries. Pop. 50,000.

Stornoway, on Lewis, is an important herring centre; whisky is distilled in Skye, Mull, and Islay; tweeds are made in Harris; and slate is quarried in Luing, Easdale, and Seil. There are no rly. lines, but communication with the mainland at various points is generally frequent enough for practical purposes. Some islands also have regular air services. The total area is about 2,800 sq. m.

The Hebrides, known to Ptolemy as the Eboudai, were invaded by successive Scandinavian bands between the 6th and 9th centuries, and, together with the Orkneys, Shetland, and the Isle of Man, fell under the dominion of Harold I of Norway c. 890. Norwegian rule maintained itself against several attacks by the Scottish kings, but in 1266, after his victory at Largs in 1263, Alexander III secured their cession to the Scottish crown for a payment of 4,000 merks.

In the 14th century the island dynasty known as the Lords of the Isles (*q.v.*) first appeared in John Macdonald of Islay, and the next two centuries were filled with the feuds of rival chieftains and clans, on the islands and mainland—Campbells, McNeills, Macleans, Macleods, and others. The Jacobite risings of 1715 and 1745 found strong support in the Hebrides, but the chiefs paid for participation in the latter by the abolition of their old hereditary jurisdictions. This was the first step towards pacification, and by the time of Johnson's visit in 1773 progress had been made.

As in many parts of the Highlands, the introduction of large-scale sheep-grazing brought many evictions and much distress among the crofting class towards the middle of the 19th century. Canada and Australia received numbers of Hebridean emigrants. The result was frequent "land-grabbing." In 1918 Lord Leverhulme (*q.v.*) purchased Lewis and part of Harris to develop the fishing and weaving industries.

During the Second Great War the Hebrides played a part in the battle of the Atlantic (*q.v.*). Radar was set up on a number of islands for detecting the presence of E-boats; at Broad Bay a radar station guided aircraft on the Atlantic Ferry to Prestwick. The chief minesweeping base in northern waters was at Stornoway, also a base for R.A.F. flying boats on the Atlantic anti-submarine patrol.

The Hebrideans retain many distinctive characteristics. Gaelic is spoken in most parts, and there are a large number of Roman Catholics. A great body of Celtic tradition in story and song has survived, and collections by M. K. Fraser of Hebridean songs, many of unknown antiquity, have made their subtle beauty widely known.

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L. MacNeice, 1938; *Hebridean Journey*, H. Sutherland, 1939; *The West Highlands and the Hebrides*, A. Harker, 1941.

Hebron (ancient Kirjath-Arba; Arab. El Khalil). Town of ancient Palestine, in the valley of Mamre, and partly on the slopes of two low hills, 16 m. S.S.W. of Jerusalem. A sacred city, it is one of the oldest in Palestine, and is many times mentioned in the Bible. It was the abode of Abraham, Isaac, and Jacob, besides other patriarchs, and its old walled mosque of Machpelah is supposed to cover the tomb of Abraham. When Moses sent spies to view the Promised Land, they went to Hebron. Joshua gave it to Caleb, and it was afterwards made a city of refuge (Joshua 20). Here David was anointed king (2 Sam. 5), and he chose it for his first capital.

The seat of a bishopric in 1167, twenty years later it fell into the hands of the Saracens, and it remained in Mahomedan hands until the end of the First Great War. Always regarded with reverence, Hebron was one of the four sacred cities, Mecca, Medina, and Jerusalem being the other three.

The modern town is in Jordan, in the centre of fruit plantations, and there are manufactures of glassware and goatskin waterbags. It is the terminus of the road S. from Jerusalem through Bethlehem. In the vicinity of Mamre is Abraham's oak. Hebron was occupied by the British under Allenby, Dec. 7, 1917. Pop. 24,560.

Hecataeus of Miletus (c. 550–476 B.C.). One of the Greek logographers or writers of history in prose before Herodotus. He took an active part in the revolt of the Ionic cities of Asia Minor against Persia (502–494). A great traveller, his *Journey round the World* contains a geographical and historical account of Europe, Asia, and Libya, with a map.

Hecate. In Greek mythology, the goddess of night, the moon, child birth, and magic. In art she is represented in triple form, probably symbolic of her different spheres. She is often confounded with Aphrodite and Selene.

Hecatomb (Gr. *hekaton*, hundred; *bous*, ox). Originally, in ancient Greece, the sacrifice of 100 bulls and then that of any large number of victims. In modern speech the word is used of any great sacrifice or slaughter. See *Sacrifice*.

Hecker, Friedrich Karl Franz (1811–81). German politician. Born in Baden, Sept. 28.



F. K. F. Hecker,
German politician
After Schertle

about his banishment from Prussia. The revolution of 1848 brought him again to the front, and he strove his utmost to establish a republican government on a stable basis.

His attempts having failed, he transferred his operations to S. Germany, where he organized bands of malcontents with the idea of terrifying the smaller states. Driven into Switzerland, he emigrated to America and occupied himself on his Illinois farm until the outbreak of the Civil War, when he entered the Federal army and rose to be brigadier-general. His latter years were spent at St. Louis, where he died March 24, 1881. The name Hecker in Germany became synonymous with a democratic revolt.

Hecker, ISAAC THOMAS (1819-88). American divine. Born in New York, Dec. 18, 1819, he became a member of the Brook Farm (q.v.) community, and for some time resided with Thoreau at his Hermitage in Walden woods.

Becoming a Roman Catholic, Hecker joined the Redemptorist Order in 1845 and worked for some years in England, where he was ordained in 1849. In 1857 he returned to America, severed his connexion with the Redemptorists, and founded the Order of Paulists for missionary work, becoming its first Superior. For over twenty years he edited *The Catholic World*, and founded *The Catholic Publication Society*. He died in New York, Dec. 22, 1888.

Heckmondwike. Urban district and market town of the W. Riding of Yorkshire, England. It is 8 m. S. by E. of Bradford on the railway. Blankets, rugs, and carpets are manufactured, and there are iron foundries and engineering works. In the neighbourhood are extensive collieries. Market days, Tues. and Sat. Near by are places connected with the Brontës. Pop. (1951) 8,657.

1811, Hecker practised law in Mannheim. In 1845 his uncompromising democratic sentiments which had already made him conspicuous in the Baden parliament, brought

about his banishment from Prussia. The revolution of 1848 brought him again to the front, and he strove his utmost to establish a republican government on a stable basis.

Hectare (Gr. *hekatón*, hundred; Lat. *area*, area). Superficial or land measure of the French metric system. It is equal to 100 ares (q.v.), or 10,000 sq. metres, being thus equal to 2.471 English acres.

Hectograph (Gr. *hekatón*, hundred; *graphein*, to write). Device for making a number of copies of a document, etc. It consists of a slab of gelatine material on the surface of which a copy of the document to be duplicated is impressed. The original document is prepared with a special aniline ink, and firmly pressed for a time on the gelatine which absorbs the ink. From this a large number of duplicates may be obtained.

The hectograph developed into, and has been largely superseded by, the rotary duplicating machine, which takes copies from a stencil. The stencil is cut by a typewriter, from which the ribbon has been removed, on a sheet of tough flexible tissue and is then fastened over a revolving cylinder, partially covered by an ink pad. Each revolution of the cylinder brings the stencil in contact with the top sheet of a pile of paper below the cylinder, and the ink, passing through the stencil, registers an impression of the type-script on the paper. The stencils can be used to reproduce drawings, maps, or handwriting, and the duplicator makes 1,500 to 6,000 copies an hour, according to whether it is manually operated, automatically fed, or power-operated.

Hector. In Greek legend, son of Priam, king of Troy, and Hecuba, and husband of Andromaché. He was the chief champion of the Trojans during the war with the Greeks, and his character as conceived by Homer makes more appeal to our sympathy and imagination than that of any other leader, Greek or Trojan. He met his death while unarmed at the hands of Achilles, who had been roused from his retirement when his friend Patroclus had been killed by Hector. His body was tied to the chariot of Achilles, and dragged off to the Greek camp. At the personal entreaty of the aged Priam, Achilles gave back the body for burial. See *Iliad*; Troy.

Hecuba (Gr. *Hekabé*). Wife of Priam, king of Troy, by whom she was the mother of Hector, Paris, Cassandra, and many other children, according to some legends 50

in all. At the taking of Troy she was carried away captive by the Greeks to the Thracian Chersonese, where her daughter Polyxena was sacrificed in obedience to the behest of the wrath of Achilles. Polynestor, the king of the country, having murdered her son Polydorus, she avenged his death by killing Polynestor's children, and putting out the king's eyes. Eventually she was metamorphosed into a dog, and threw herself into the sea. The events of her later life are the subject of Euripides' tragedy *Hecuba*. In Shakespeare's *Hamlet*, it is the simulated passion of the travelling player delivering a recital about the Trojan War that prompts Hamlet's famous cry, "What's Hecuba to him or he to Hecuba?"

Hedemarken, or **HEDMARK**. Fylke or co. of E. Norway, bordering on Sweden. Mountainous in the N., some of its peaks attain an elevation of 6,000 ft. Among its numerous lakes is Lake Fämund and a portion of Lake Miosen on the W. boundary. Hedemarken comprises the valley of the upper Glommen, one of the most fertile regions in Norway. Area, 10,621 sq. m. Pop. 167,584.

Hedge. Live fence in a garden or between fields. Hedges are planted on the boundaries of fields and gardens as screens and shelter belts; also in gardens to screen one part from another. The trees and shrubs used in gardens are of two kinds, evergreen and leaf-losing. The best evergreen boundary hedge is of holly; laurel is also commonly planted. Yew should not be used, for the leaves are harmful to cattle. Of leaf-losing kinds, quick or thorn, hornbeam and beech are recommended. Privet, either green or golden-leaved, is often used to enclose small gardens.

For planting within the garden to make tall evergreen hedges, there is a choice of yew, arbor vitae, box, or Lawson's cypress. Evergreen honeysuckle makes a good hedge up to 4 ft. Of leaf-losing hedges within the garden, the oval-leaved privet, beech, and hornbeam are suitable. It is difficult to get flowers to grow near hedges, so the latter should be planted alongside paths if possible.

Flowering shrubs may provide informal hedges, but cannot be clipped closely. Examples are the Japanese briar, *Prunella* briar, the barberries *Darwinii* and *stenophylla*, *laurustinus*, and *pyrus*.



Isaac T. Hecker,
American divine

japonica. Lavender makes a good low hedge, as does grey-leaved cotton-lavender or santolina. In mild seaside districts Monterey cypress forms a splendid tall evergreen hedge; there also euonymus, escallonia, tamarisk, and hardy fuchsia.

Particular care must be taken in planting evergreen hedges: the trees are likely to fail if the roots are allowed to become dry. For tall hedges, a site 2 ft. deep and 3 ft. wide should be dug, and manure added if possible. Evergreens are best planted in Sept.-Oct. or April-May; the leaf-losing kinds in Nov.-early Dec. or Feb.-March. Hedge plants should be set at the following distances apart: privet, beech, hornbeam, box, and holly, 15 ins.; yew and laurel, 2 ft.; Lawson's cypress and arbor vitae, 3 ft.; lonicera, 12 ins.; quick or thorn, 9 ins.; the last two being generally planted in a double row, the lines 12 ins. apart. Privet hedges must be clipped several times between May and Sept. Yew, holly, arbor vitae, box, and cypress are clipped early in Aug. and, if necessary, trimmed in May. Hornbeam, beech, and thorn may be cut in Feb.; laurel in Aug.; lonicera in May and Aug.

Hedgehog (*Erinaceus europaeus*). Common British mammal, belonging to a genus with many species in various parts of the world. It is the largest of the British insect-eating animals, and the only one provided with a defensive armour of spines. It is about 10 ins. long, and has a short tail of about 1½ in., a snout somewhat like that of a pig, and very short limbs. Hedgehogs have the power of rolling themselves into a ball, with the head and limbs tucked in so that nothing but an array of sharp spines is presented to an enemy. They are nocturnal in habit, and are seldom seen in the daytime, which they spend asleep in hedges and thickets.

Their food consists of insects, snakes, worms, snails, slugs, and birds' eggs, varied occasionally by small birds and mammals, to-

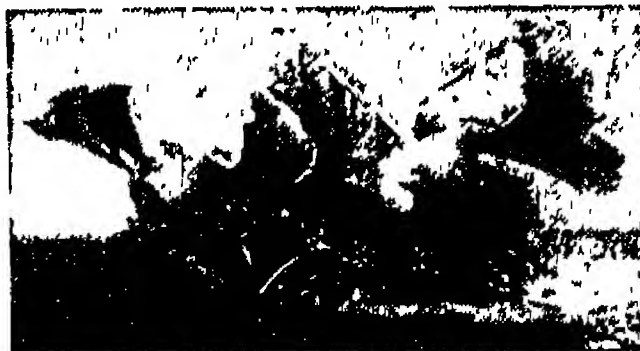


Hedgehog. Specimen of the common British variety

gether with fruit and roots. The hedgehog breeds in summer and early autumn, and produces three or four young ones at a birth. It hibernates during the winter months, sleeping rolled up in a ball beneath a mass of dead leaves or moss. Except where game is preserved, the hedgehog is a harmless animal and is useful in destroying garden pests.

Hedgehog Defence. Defensive system first developed by the German army during the later stages of the Second Great War. Towns were used as nuclei of all-round defence, the surrounding villages being converted into outlying strongpoints. The "hedgehog" was used in face of the various Russian advances on the eastern front, and proved for a time a formidable obstacle. Eventually the Russians learned to bypass a "hedgehog," leaving the garrison to be contained by following troops. See Fortification text and illus.

Hedgehog Mushroom (*Hydnum*). Genus of fungi of the family Hymenomycetaceae. They are char-



Hedgehog Mushroom. Specimen of the edible *Hydnum repandum*

acterised by the spore-bearing surface taking the form of fleshy, awl-shaped spines instead of the plate-like gills of the common mushroom. Several species are among the best of the edible fungi, notably *H. repandum*, which grows in woods, sometimes forming rings or a segment of a circle. It has a short, thick stem, and the spines which cover the underside of the cup extend some way down the stem. Its colour is a pale flesh tint. Another good esculent is *H. imbricatum*, with rough scaly top of a warm brown colour.

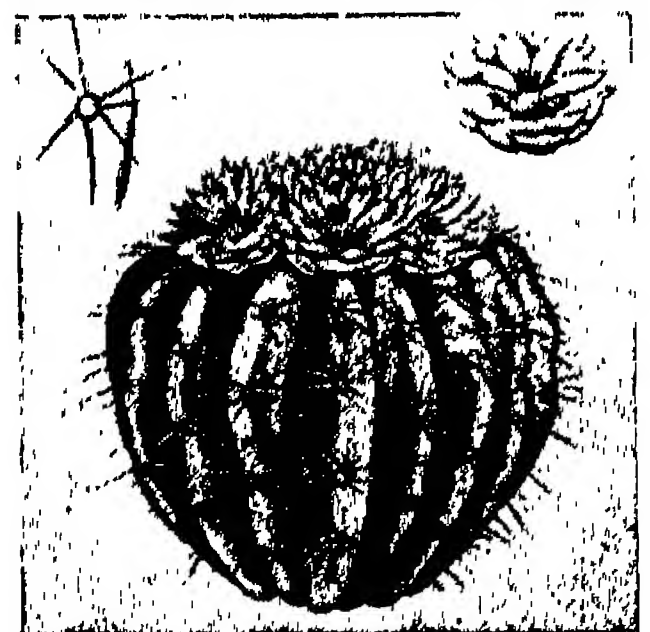
Hedgehog Plants (*Echinocactus*; *Echinopsis*). Two genera of succulent, leafless plants of the family Cactaceae. Natives of the hot, dry parts of America, they are more or less globular or cylindrical, with tubercles or ridges that bear bundles of long-spreading spines. The flowers are large and handsome, white, yellow, rose or purple. *Echinocactus visnaga* attains a very large size, and its long spines are used as toothpicks.

Hedgehog Projector. Anti-submarine weapon developed by the Royal Navy during the Second Great War. Normally depth charges have to be dropped when the stern of the attacking vessel is approximately over the target; this results in a "dead space" between the last Asdic (q.v.) echo and the release of the depth charge pattern. The hedgehog projector, which consists of a spigot mortar, overcame the dead space, during which a U-boat might take successful evasive action, by firing its projectile while the submarine was still in Asdic contact. The projector fired a salvo of 24 charges, each containing its own propellant and 32 lb. of high explosive, ahead of the ship in the form of an ellipse 120 ft. by 140 ft. A direct hit had to be made to ensure a kill; a near miss was not so effective as a pattern of depth charges dropped normally.

Hedge Hyssop (*Gratiola officinalis*). A perennial herb of the family Scrophulariaceae. It is a native of Central Europe, and has opposite, lance-shaped leaves with toothed edges, and whitish flowers streaked with purple. Formerly used as a purgative and emetic, it was abandoned in medical practice owing to its dangerous properties.

Hedgeley Moor. Locality in Northumberland, England, 8 m. N.W. of Alnwick, famous for the battle fought here during the Wars of the Roses, April 25, 1464. The Lancastrians were making a new effort and a party of them met here some Yorkists led by Lord Montagu, Warwick's brother. The Lancastrians were worsted, and Sir Ralph Percy, one of their leaders, was killed.

Hedge Mustard (*Sisymbrium officinale*). Annual herb of the family Cruciferae. It is a native of Europe, W. Asia, and N. Africa. It is sometimes 2 ft. in height.



Hedgehog Plant. Specimen of *Echinocactus melocactus* showing, left, spines and, right, flower



Hedge Mustard. Flowers and lobed leaves of the wild plant

The leaves are deeply cut into lance-shaped lobes; the flowers are pale yellow, and minute, in a spray. Garlic mustard (*Alliaria officinalis*) with kidney-shaped lower leaves, and larger, white flowers, has a strong odour of garlic when bruised.

Hedge School. Name given to primitive schools set up by private persons in remote districts of the U.K. before education became compulsory. They were common in Ireland, especially in Kerry. Parents of the pupils paid the teachers in produce of the soil. The use of the word hedge to imply inferior is exemplified also in such terms as hedge priest, hedge marriage, and in Shakespeare's hedge-born (1 Henry VI, iv, 1).

Hedge-Sparrow or **ACCENTOR.** Small bird, probably related to the thrushes; it is not related to the house sparrow. It occurs in Europe, including Great Britain, N. Africa, and parts of Asia, usually in thickets and hedges in hilly districts. The beak is rather



Hedge-Sparrow

soft, the tail square. Its plumage is dusky brown, reddish on the back, bluish-grey on head and neck. It nests early in the spring in hedges, usually near human habitation, and frequents gardens in the winter. The eggs are blue without spots.

The Alpine variety of the hedge sparrow is larger than the British and has a white throat spotted with black. It lives among the mountains of Europe, and occasionally visits the British Isles.

Hedging. The art of keeping hedges in order. A newly established hedge must be protected for four years, after which it is trimmed from time to time and

occasionally "laid," when dead or unnecessary growths are cut out and selected stems are slashed and then bent into position to bind the hedge together. The cutting implement used, a hedge slasher or switch bill, consists of a short blade, usually slightly curved near the end, fixed in a long wooden handle.

Hedin, SVEN ANDERS (1865-1952). A Swedish explorer. Born at Stockholm, Feb. 19, 1865, he attended Swedish and German Universities. Beginning his travels at 20 in Persia, he visited many little-known areas of central and E. Asia, publishing a book about Asia in 1898. Next he went to the Gobi Desert and Tibet, of which in 1906-08 he made the first detailed map. In 1902 he was raised to the Swedish peerage; a British knighthood was conferred on him in 1900. Early in the First Great War he wrote for the German government a report on war devastation in Belgium, revealing then and thereafter a strong anti-British feeling.

Hedin went round the world in 1923; undertook an expedition in Sinkiang, 1927-28, and travelled in Mongolia, 1928-30; and was head of the Sino-Swedish expedition throughout 1927-35. In China he organized meteorological stations and collected useful archaeological material. Twice his party were held captives by bands of Tungas. The titles of Eng. trans. of famous books by Hedin are *From Pole to Pole*, 1911 (trans. into 14 languages); *Southern Tibet*, 9 vols., 1917-22; *My Life as an Explorer*, 1925; *Riddles of the Gobi Desert*, 1933. He died at Stockholm Nov. 26, 1952. *Con-sult* *Diary*, Eng. trans., 1951.

Hedjaz. See *Hejaz*.

Hedley, WILLIAM (1770-1843). British inventor and railway pioneer. Born at Newburn-on-Tyne. July 13, 1779, he became a mining engineer and turned his attention to improving the methods of hauling coal from the pits to the Tyne. He introduced engines by Trevithick, Blenkinsop, and Chapman at his collieries. The first to realize that teeth and racks were unnecessary, Hedley, on March 13 1813, patented his locomotive Puffing Billy to run on smooth rails. It was put into

service between Wylam colliery and the river. Hedley discovered the principle of the blast pipe, a method of producing a greater draught by returning the exhaust steam into the chimney. In 1822 he put into operation one of the first tugs. At Callerton colliery he introduced an improved system of steam pumping for removing water from the workings. He died Jan. 9, 1843.

Hedon. Borough, once a flourishing port, of Yorkshire (E.R.), England, near the Humber, 5 m. E. of Hull. It has a notable cruciform church, S. Augustine's, with a beautiful west front and a tower. Hedon received a charter from Henry II, and in the Middle Ages had a trade guild, while much shipping entered the port, which was connected with the Humber. It was made a municipality in 1661 and returned two M.P.s until 1832. There is trade in local agricultural produce. Pop. (1951) 1,991.

Hedonism (Gr. *hēdonē*, pleasure). View of life which regards pleasure (bodily or mental) as the greatest good. It was the chief doctrine of the Cyrenaics, and to a certain extent the Epicureans, and, in the 18th century, in its grossest form it found staunch supporters in Helvétius, Holbach, and La Mettrie, of the French materialistic school. In more recent times a refined form of hedonism, represented by Bentham, James and John Stuart Mill, Herbert Spencer, and others, was associated with the doctrine of Utilitarianism which, while upholding the hedonistic theory, sought the greatest happiness of the greatest number.

Heem, DAVID DE (c. 1570-1632). Dutch painter. Born at Utrecht, he was a still life painter of considerable distinction. Some works of his son and grandson have been wrongly attributed to him. The National Gallery, London, contains a study of fruit and flowers by him, and the Uffizi gallery at Florence has a good example.

Heem, JAN DAVIDSZOON DE (c. 1606-c. 1684). Dutch painter. Born at Utrecht, he was the son of David de Heem. He learned much from his father, but surpassed him both in variety of his still life subjects and in technical equipment. His colour is rich, and, within the compass of still life, he may be counted among the most notable of the minor Dutch artists of the 17th century. Examples of his work are to be found in many German galleries and at the Louvre, Amsterdam, and The Hague, while the



Sven Hedin, Swedish explorer



Heem. Typical still-life by the 17th century Dutch painter, Jan Davidsz de Heem
Wallace Collection, London

Wallace Collection has two. His son was Cornelis de Heem (1631-95), who ably carried on the style of his family in painting, working at Antwerp and The Hague.

Heenan, JOHN CARMEL (1835-73). American pugilist. Born at Troy, N.Y., May 4, 1835, he was apprenticed at 15 to a blacksmith at Benicia, California (whence his sobriquet, the Benicia Boy), and soon became known on the Pacific coast as a strong and bold fighter. In 1860 he came to England and fought his battle with Tom Sayers (*q.v.*), at Farnborough, Hants, April 17. The fight ended in a draw after 37 rounds. Heenan afterwards toured in England with circus troupes. On being beaten by Tom King in 1864, he returned to America, where he made and lost several fortunes. He died at Green River City, Wyoming, Oct. 25, 1873.

Heep, URIAH. Character in Dickens's novel *David Copperfield*. Clerk to Mr. Wickfield, the lawyer, and eventually unwelcome suitor for the hand of Agnes Wickfield, he is presented as an unwholesome figure, red-haired and damp-handed, with the writhing, cringing manner of false humility. His perpetual claim to be "umble" is, however, a thin cloak for envy, hatred, and a malicious furthering of his own ends.

Heere, LUCAS DE (1534-84). Flemish painter. Born at Ghent, he studied under Frans Floris, and while still young executed for the Regent of the Netherlands a picture of Solomon and the Queen of Sheba, in which Solomon is a portrait of Philip II of Spain. He visited England (1568-77), where he painted a curious allegorical picture, now at Hampton Court, containing the portrait of Queen Elizabeth, and Paris, where he

designed some tapestries for Catherine de' Medici, and where he died. His portraits included those of Queen Elizabeth, the earl of Essex, and the duchess of Suffolk.

Heerlen. Town of the Netherlands, in the prov. of Limburg and near the German border, 10 m. N.W. of Aix-la-Chapelle. It is a mining town on the verge of a small coalfield. The fine 13th century Romanesque church has been enlarged. Pop. 56,290.

Hefele, KARL JOSEPH VON (1809-93). German theologian and historian. Born at Unterkochen, Württemberg, March 15, 1809, he was educated at Tübingen, where he became professor of patristics and church history in 1840. He was a member of the national assembly of Württemberg, and in 1869 was appointed bishop of Rottenburg. A Roman Catholic, he opposed the dogma of papal infallibility, but submitted to the decree when it was promulgated. He was the author of an edition of the Apostolic Fathers, a standard History of the Councils of the Church (Eng. trans. 5 vols. down to the year 738), and other works. Hefele died at Rottenburg, June 5, 1893. *Pron.* Hay-feler.

Hegel, GEORG WILHELM FRIEDRICH (1770-1831). German philosopher. Born at Stuttgart, Aug. 27, 1770, he studied at Tübingen and was for some years a private tutor. In 1801 he was appointed to a professorship at Jena, which he was obliged to relinquish owing to the political upheaval. After the battle of Jena, 1806, he removed to Bamberg, where he edited a newspaper. In 1808 he became rector of the academy at Nuremberg, where he remained eight years. In 1816 he became professor of philosophy at Heidelberg, and in 1818 succeeded Fichte at Berlin, where he died of cholera, Nov. 14, 1831.



G. W. Hegel

From a print

The style of Hegel's writings is extremely involved and obscure. His system is divided into three parts: Logic, the science of pure ideas, of universal notions; the philosophy of Nature, the development of the real world; the philosophy of Spirit (mind), the development of the ideal world, the concrete spirit that attains actuality in ethics, politics, art, religion, and science. These three divisions correspond to three phases of the Absolute—position, negation, and a combination of both. The Absolute is at first pure, immaterial thought; it is then broken up into the infinite atomism of space and time; lastly, it returns to itself and thus becomes actual thought or spirit. The universal principle of the system is the idea; Being and the idea are identical. The idea contains in itself the capacity for developing into all the determining attributes of being, into all that makes Being Being.

Movement Essential to Being

At first indeterminate, without properties or qualities, Being passes out of this condition and passes into otherness, its negation, its opposite. This negation becomes the principle of a continuous series of higher and successive affirmations. Thus, pure light is the same as darkness and is at first invisible, but after it has passed into darkness it returns to itself, takes on colour, and thus becomes visible. Everything must have an opposite or contradictory; were it not so, nothing could come into existence. The essence of this system is activity and movement. This is a return to the theory of Heraclitus, that nothing remains the same, that all things are in a constant state of flux and their permanence only illusory. Nothing is, but only becomes.

The idea is at once nature, God, and humanity. At first confined within itself, it separates from it and posits itself in what is another self, the external world. It then returns to itself, improved and developed, to go through a further series of developments, becoming ever freer and more conscious of itself. God Himself is nothing but the self-development of the absolute; He does not exist in Himself as a perfect being. Like everything else, He never is, but is always becoming. Similarly, man has no separate personality, being merged in God. Nor is God distinct from the external world; God, nature, and humanity are one. This is pantheism, but a pantheism essentially different from Spinoza's,

whose god (substance) is an absolute unity.

By his support of existing Prussian institutions Hegel obtained great political and social influence. His theories are set forth in *The Philosophy of Right*. All changes and revolutions are only milestones on the road of progress. The individual is of no value by himself; he is absorbed in the family, the family in the state, the real substance of which, individuals, are accidents. The state in return must protect the individual and allow him a certain amount of freedom (liberty of the press, trial by jury, popular representation), but not so as to interfere with progress. Constitutional monarchy is the best form of government, a king being necessary "to dot the i's." War is indispensable to progress, might is right, the weaker state is inferior to and absorbed in the stronger. All states will finally be absorbed in the general movement of the universe. *Pron.* Haygel. *See* Pantheism; Philosophy; State.

J. H. Freese

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Hegesias. Greek philosopher. Belonging to the Cyrenaic school, he flourished in Alexandria about 320-280 B.C. Surnamed *Peisithanatos*, or recommending death, from his gloomy outlook upon life, he

regarded the attainment of positive enjoyment as impossible, and declared that death was preferable. According to him, the prevention of pain and indifference to externalities were the objects the wise man should set before him. His treatise entitled *Apokarterôn*, starving oneself to death, had so great an influence on his followers that some of them ended their lives.

Another Hegesias was a sophist and rhetorician, a native of Magnesia at the foot of Mt. Sipylus in Asia Minor. He is considered the originator of the Asiatic or florid school of oratory. He is also said to have written a life of Alexander the Great.

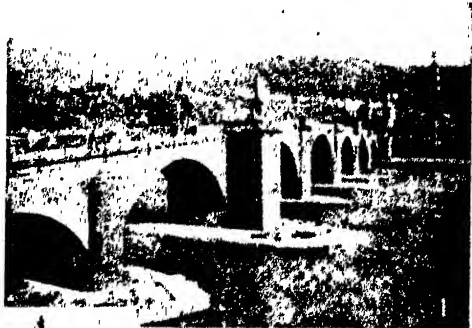
Hegesippus (c. 120-180).

Christian writer. He was born in Palestine, and was probably a Jewish Christian. He visited Corinth and appears to have written his books in Rome. He prepared a list of the Roman bishops, and

War, somewhat condensed and containing additional matter from other sources. The work probably belongs to the 4th century A.D. Unless there is a confusion between this supposed Hegesippus and the Christian writer, it is probable that the name is simply a corruption of the name Josephus, adopted by the author of the translation.

Hegira. Anglicised form, also spelt *hejira* (q.v.), of the Arabic word for flight.

Heidelberg. Tn. of Württemberg-Baden, Germany, on the Neckar, 15 m. from its junction with the Rhine, and 54 m. S. of Frankfurt. It is a rly. centre and has



manufactures, but its main interests are historical, while its beautiful situation between hills reaching 1,000 ft. attracts many visitors and residents. Of the buildings the chief is the ruined castle. This stands on a hill, and was in its prime perhaps the largest in Germany. Dating from the 13th century, it was enlarged by several electors palatine who lived here. The elector Charles Louis restored it after the Thirty Years' War, but it was much damaged by the French in 1689 (N.S.). In 1764 it was struck by lightning. The chief portions are the Otto Heinrichsbau of the 16th century, a beautiful piece of work, richly decorated with sculptures, and the Friedrichsbau of the early 17th. The Friedrichsbau was restored 1897-1903, and houses a museum of antiquities. The great tun of Heidelberg, a vat holding 48,730 gallons, is in the cellars. Remarkable features of the castle include the chapel.

Heidelberg itself stands on the S. bank of the Neckar, with the suburbs of Neuenheim and Handshuhsheim on the N. Two bridges, one having a fine gateway, unite the two. The old buildings are in or around the long High Street. These include the churches of S. Peter and the Holy Ghost

wrote a work called *Hypomnematia* (Notes or Memorials), the earliest attempt at a history of the Christian Church, of which fragments are preserved in Eusebius.

Hegesippus is also the name formerly given to the author of a Latin translation, in five books, of Josephus's *History of the Jewish*



Heidelberg, Germany. 1. The Neckar Bridge, with the town and castle. 2. The Friedrichsbau, portion of the castle built 1601-7. 3. The castle from the north

The squares include the market place, the Ludwigsplatz, and Bismarckplatz. There are a town hall, a public promenade, the Anlage, a hall for concerts, etc., and on the market place a remarkable old house. Heidelberg university was founded in 1386 by the elector Rupert. The present buildings were begun in 1712. The library houses a most valuable collection of over a million books and MSS. The university has hospitals, laboratories, and an observatory. In the 17th century it was a stronghold of Protestantism.

Heidelberg has manufactures of cigars, leather, fountain pens, surgical instruments, and furniture, while tobacco is grown near. It has electric tramways and there is a cable rly. from the corn market to the castle. Near the town are some noted beauty spots, especially the Molkenkur and the Heiligenberg with the ruins of an abbey. Heidelberg became important when in 1228 the count palatine of the Rhine made it his capital. During the Thirty Years' War it was taken by Tilly and by the Swedes, but was restored to the elector in 1648. In 1721 the capital was transferred to Mannheim, and in 1803 Heidelberg became part of Baden. Units of the U.S. 7th army captured it virtually undamaged, March 30, 1945. Pop., pre-war, 85,000.

Heidelberg Catechism, THE. Symbol and summary of the reformed evangelical faith, published at Heidelberg, 1563. It was written at the instigation of the elector palatine, Frederick III, by Zacharias Ursinus (1534-83) and Caspar Olevianus (1536-87), with the object of ending the conflict then raging in the Palatinate between Lutherans and Calvinists by setting out the evangelical faith in terms incapable of being misunderstood. It contains 129 questions divided into three parts, treating respectively of man's sin and misery, of his redemption by Christ, and of the Christian life. Into these three divisions the decalogue, the creed, the Lord's prayer, and the doctrine of the Church and the sacraments are fitted as parts of an organic system, making an easy and simple, yet profound and comprehensive, whole, unmatched by any other of the Reformation catechisms.

First issued Jan. 19, 1563, an official Latin translation being published the same year for use in the higher seminaries and schools, the Heidelberg Catechism, despite opposition from the ultra-Lutherans, won its way into the hearts of

the Christian world. It was approved by the Synod of Dort in 1619, and has been translated into all the languages of Europe, and into Hebrew, Arabic, and Malay. Moderate in its statement of doctrine, free from metaphysical subtlety, charged with a gracious spirit, and expressed in language of rhythmic beauty, it breathes an undecaying life and remains one of Germany's noblest national monuments.

Heidelberg Jaw. Fossil mandible of primitive man found by Otto Schoetensack, in a sand-pit at Mauern, near Heidelberg, in 1907. From contiguous animal remains it is inferred that the Heidelberg race may have been a rude precursor of the Neanderthal.

Heidenheim. Town of (West) Germany, in the *Land* of Württemberg-Baden. It stands on the river Brenz, 22 miles north-north-east of Ulm. In ancient times it was a Roman settlement. It lies at an altitude of 1,617 ft. to the E. of the Swabian Alps, and is overlooked by the ruins of the Schloss Hellenstein. Becoming a place of some importance in the Middle Ages, it is now an industrial town, with manufactures of textile goods, machinery, earthenware, etc. Pop. (est.) 25,000. There is a smaller town of the same name in Bavaria, 21 m. S.S.E. of Anspach.

Heidenstam, CARL GUSTAF VERNHER VON (1859-1940). Swedish poet and writer, born July 6, 1859, at Olshammer. At the age of 17 he went to Paris to study art, but abandoning this, spent some years in travel. On his return to Sweden he published his first book, poems entitled *Wanderings and Pilgrimages*, 1888, which immediately secured him recognition. The poems were followed by prose—tales, sketches, brochures, and a novel of life under Turkish rule in Damascus, *Endymion*, 1889, glowing with colour and romance. *Hans Alienus*, 1892, is a remarkable book, rich in original thought, expressed in a new and beautiful form.

Heidenstam then returned to poetry in *Poems*, 1895, and after some months in Russia published his most popular work, *The Carolins*, 1897, which consists of a series of stories centred upon Charles XII, and counts among the finest Swedish prose ever written (Eng. trans. A King and his Campaigners, 1902). This and other historical books, *The Pilgrimage of S. Bridget*, and *The Swedes and their Chieftain* (Eng. trans. 1909), are masterpieces of

their kind, burning with the author's love of country. In 1916 Heidenstam was awarded the Nobel prize for literature. He died May 20, 1940.

Heidingsfeld. Town of West Germany, in the *Land* of Bavaria. It lies on the left bank of the river Main, 2 m. S. of Würzburg, and is an important market for wine and fruit. It is mentioned in documents dating from 799, and was made a city by the Emperor Charles IV in 1367.

Heifetz, JASCHA (b. 1901). Russian-born American violinist. Born at Vilna, Feb. 2, 1901, he began to study the violin at 3, and at 9 entered the St. Petersburg conservatoire, where he studied under Auer. At 12 he made a European tour, performing the most difficult works and receiving the highest praise from critics. He appeared in Vienna under Safonov and in Leipzig under Nikisch. Escaping from Russia during the revolution in 1917, he went to the U.S.A., where he was naturalised in 1925. He made his London début at Queen's Hall in 1920, and later appeared as soloist with orchestras under Koussevitsky, Stokowski, Toscanini, and other world famous conductors. He played in Japan, China, Manchuria, and Korea in 1923, and made a world tour in 1925-27, visiting Europe, N. Africa, S. America, Asia, and Australia. His performances were notable for subtlety of expression and perfect balance.

Heijo. Japanese name for the Korean town of Pyongyang (*q.v.*).

Heilbron, SIR IAN MORRIS (b. 1886). A Scottish chemist. Born Nov. 6, 1886, at Glasgow, educated at its high school and Royal technical college and at Leipzig university, he was appointed lecturer at the Royal technical college in 1909. Following service in the R.A.S.C. in the First Great War, he held the chair of organic chemistry at Liverpool, 1920-33, Manchester, 1933-35, and London from 1938. In 1939 he became a scientific adviser to the ministry of Supply, and in 1942 to the ministry of Production. He served on the advisory council on scientific and industrial research, and on the tsetse fly committee of the Colonial office. A Longstaff and Davy medallist, he was awarded the Priestley medal of the American Chemical Society for his work on synthetic penicillin; this was the first occasion upon which the medal had been awarded outside the

U.S.A. He edited the Dictionary of Organic Compounds and Thorpe's Dictionary of Applied Chemistry.

Heilbronn. A town of Württemberg-Baden, W. Germany. It stands on the Neckar, 28 m. by



Heilbronn, Germany. The church of S. Kilian from the south-west

ry. N. of Stuttgart. Belonging to the Franconian dukes from the 8th century, later to the Würzburg bishops, it became a free city in 1530, and passed to Württemberg in 1802. Its great past is reflected by the huge pile of S. Kilian's church, 13th century Gothic, with a 200-ft. tower in Renaissance style built 1527; by two other churches of the 13th-14th centuries, the town hall, a range of buildings erected 1417-1765, and a castle of the Teutonic Knights. The association with Götz von Berlichingen, the revolutionary knight immortalised by Goethe, is preserved in a wall tower where he was imprisoned; that with Schiller in a house near S. Nicholas's church; and that of the first Protestant service in Germany, 1525, in that church.

Heilbronn has been famous for an intellectual life which gave Germany many democratic leaders. It has a permanent theatre, several museums, numerous public and special schools. Its products include tools and machines, paper, jewelry, furniture, pianos, and food preserves. Heilbronn is linked with the Rhine by a chain-towed traffic line along the Neckar. Pop. 60,308.

Heil Dir im Siegerkranz. German national song: Hail to thee with victory crowned. The

words were written, to the tune of the English God Save the King, by Heinrich Harries, a Holstein pastor, in honour of the king of Denmark, and were first published in 1790. A few years later it was appropriated, after some adaptation, by Prussia, and remained Prussia's chief national anthem until the First Great War, when it was discarded owing to the indisputably British origin of the music.

Heilsbronn. Town of Germany, in Bavaria. It lies 16 m. by rly. S.W. of Nuremberg. Its main interest lies in its old connexion with the Hohenzollerns, many of the Franconian line of the family having been buried in the Romano-Gothic church of the once famous Cistercian monastery. The three first Brandenburg Hohenzollerns were also buried here. The church contains many memorials of the early Hohenzollerns, and some fine altar-pieces of the Nuremberg school. The building was begun as a basilica in 1132, Gothic additions being made later. Pop. 1,655.

Heilungkiang. Northernmost of the provinces of Manchuria, China. Area, 189,000 sq. m. Its capital is Harbin. Railways and highways connect it with other parts of the country. It embraces the Hsiao Hsinganling range, with numerous forests, and fertile plains in the W. The winter is extremely cold. Timber, gold, and kaolin are produced; millet and soya beans are grown. Sungkiang (q.v.) was merged in Heilungkiang in 1955. Pop. (1953) 11,897,309.

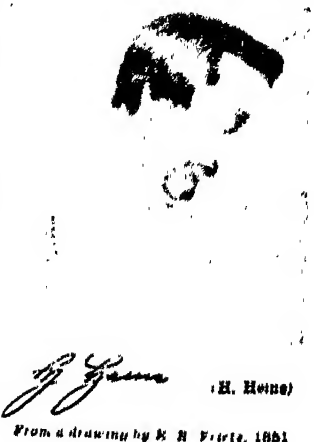
Heimin (Jap., commoners). Third and lowest social class under the feudal system in Japan. The *heimin* were divided into farmers, artisans, and tradesmen, and ranked in that order below the samurai, their masters. The farmers and artisans, who included artists and craftsmen, were treated with respect, but the trading class with contempt. None of the *heimin* had any social status, or intercourse, or any income beyond what was earned.

Heimwehr (Ger., home defence). Politico-military organization established in Austria in 1925. It preached a reactionary nationalist programme and was bitterly anti-Socialist. In 1930 Prince Starhemberg (q.v.) became leader of the Heimwehr, which in 1933 joined the Popular Front of Engelbert Dollfuss (q.v.). It kept Dollfuss in power and was used to crush the Socialist revolt in 1934. Major Emil Fey eventually gained control of the whole movement,

though constantly challenged by Starhemberg. As the growing power of the well equipped Heimwehr constituted a threat to the civil government, it was first disarmed, then dissolved, by decrees in 1936.

Heine, HARNKEN (1797-1850). German poet. Born at Düsseldorf, Dec. 13, 1797, of a poor Jewish family, he was sent, after leaving school, to Hamburg, where a wealthy uncle, Salomon Heine, initiated him into a business career. He proved himself, however, incapable, went bankrupt, and then, still with the support of his uncle, studied law at the universities of Bonn, Göttingen, and Berlin. In these years, 1819 to 1824, he discovered his lyrical genius under the stimulus of unhappy love affairs with his cousin, Amalie Heine, and, after her marriage, with her sister Therese. In 1822 he published a collection of Poems, followed in 1823 by Tragedies, which, although they contained some of the most familiar poems later incorporated in his Book of Songs, were appreciated by only a few.

In 1825 Heine became a convert to Christianity, and in the same year obtained his degree from Göttingen. Owing to the very great success of his two volumes of Pictures of Travel: the Journey in the Harz Mountains, 1826; The North Sea; Buch Le Grand, 1827, he decided to devote himself to literature; and with the appearance of The Book of Songs, in 1827, he became the most popular poet of his day. A visit to England, a stay of some months in Munich, where he was editor of a new paper, and a journey to Italy provided him with the material for fresh Pictures of Travel: Journey from



(H. Heine)

From a drawing by E. N. Frits, 1861

Munich to Genoa; The Baths of Lucca, 1830; The City of Lucca; English Fragments, 1831.

Like all young men of letters of the time, Heine was stirred by the July Revolution of 1830, and in 1831, disappointed and embittered by the treatment meted out to him at home, he settled in Paris, which remained his home for the rest of his life. Only twice, in 1843 and 1844, did he revisit his native land. Heine was intimately associated with the literary school of "Young Germany," and when in 1835 the government suppressed the activities of the school, he was included in the ban. This interfered with his literary plans; but his uncle did not withdraw his support, and from 1837 to 1848 he was also in receipt of a pension of 4,800 francs (about £200) from the secret fund of the French Government. In 1834 he became intimate with a Frenchwoman of the people, Eugénie Mirat, who inspired him with a lasting affection; and in 1841 she became his wife.

Heine in Paris

During the earlier part of his stay in Paris, Heine's activity was mainly journalistic; he contributed to German newspapers articles on French life, art, and letters. These were followed by four volumes, entitled *The Salon*, 1834-40, which, however, include much more than criticisms of pictures; the principal content is indeed a study of religion and philosophy in Germany, while the later volumes are mainly made up of short stories, such as *The Rabbi of Bacherach*. A later collection bore the title *Lutetia*, 1854. In *The Romantic School*, 1836, Heine criticised with uncalled-for virulence the literary school from which he had himself sprung, and in *Ludwig Börne*, 1840, he attacked his friend and fellow-fighter in the ranks of "Young Germany."

In 1844 he came forward again, with two volumes of *New Poems*, and a satiric epic, *Germany, a Winter Tale*. These were followed, in 1847, by *Atta Troll*, generally recognized as his finest sustained poem, and in 1851 by the collection of poems entitled *Romanzero*. But in 1845 Heine fell a victim to creeping paralysis, which from the spring of 1848 till his death in Paris, Feb. 17, 1856, kept him practically bedridden. In spite of his sufferings, he maintained his mental vigour and freshness, as is to be seen in the wonderful *Last Poems and Thoughts*, which were published posthumously in 1869; indeed, it might be said

that in these years Heine underwent a kind of spiritual regeneration, which to himself was bound up in some mystic way with the romantic devotion of the young poetess Camille Selden (*La Mouche*).

Heine's position among the German lyric poets of the 19th century has been influenced by other than literary factors, and is difficult to define. His Jewish characteristics have been a stumbling block to appreciation by many of his own countrymen, his personal life affords few aspects that awaken sympathetic admiration. And yet *The Book of Songs* is incontestably the greatest, as it has been the most popular, collection of German lyrics of the 19th century. At times Heine's poetry seems lacking in the suggestiveness of the lyricism of Goethe, Eichendorff, or Mörike; and only too often he destroys by an ill-placed gibe or satiric quirk the effect of the purest lyric. Yet he is free from the vague and nebulous sentimentality into which German poetry too easily falls; his imagery is plastic and his metaphors daring almost to the verge of paradox.

As a prose writer Heine's claims are also high; his style, doubtless modelled in part on that of his French contemporaries, forms the greatest possible contrast to the clumsiness of the German prose style of his time. He began his career as a Romanticist, but became a leader of that school which formed the antithesis and negation of Romanticism, "Young Germany." The tragedy of Heine's intellectual life lay in this discord. An exile from his native land, he remained also as a poet a spiritual exile from that romantic world out of which he drew his purest inspiration.

J. G. Robertson

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Heinemann, WILLIAM (1863-1920). British publisher. Born at Surbiton, May 18, 1863, he was associated with Nicholas Trübner, the publisher of Oriental works, of whose business he became manager in 1884. He founded the publishing house of William Heinemann and issued his first book, Hall Caine's *The Bondman*,

in 1890. He was author of three plays, *The First Step*, 1895; *Summer Moths*, 1898; and *War*, 1901. He died in London, Oct. 5, 1920.

Heinkel. German aircraft construction company. It was founded in 1922 by Dr. Ernst Heinkel, whose experience of aircraft design dated back to the First Great War. The most notable civil Heinkel of the next decade was the single-engined He 70, claimed to be the fastest air transport machine at its début. Adaptation to the military needs of the then secret Luftwaffe was rapid; and the twin-engined He 111, tried out in the Spanish Civil War of 1936, was one of the first high speed monoplane bombers.

It was used during the early campaigns of the Second Great War, including the battle of Britain, but against determined opposition proved lacking in both speed and defensive power, and carried a light bomb load. Later standardised products were the He 115 float-seaplane, He 177 heavy bomber, and He 162 jet-propelled "people's fighter"—one of Germany's last weapons against the Allied air invasion. The first jet-propelled aeroplane to fly was the experimental He 178, on Aug. 27, 1939. See *Aeroplane illus.* p. 132.

Heinsius, ANTONIUS (1641-1720). Dutch statesman. Born at Delft, Nov. 22, 1641, he studied law at Leyden, and in 1679 was appointed to a government office in his native city. Intimate with William of Orange, he became foreign minister and pensionary of Holland on the accession of the former to the crown of England, and acted as William's agent in the Netherlands. His unwavering opposition to France made him the successor of William as a fierce opponent of Louis XIV, and Heinsius played a prominent part in promoting the alliance in 1702 of the European powers against the French king. He supported Marlborough's plan of taking the Allied army to S. Germany, which led to the victory of Blenheim. He refused to listen to any suggestion of peace until, deserted by England, he realized the impossibility of continuing the struggle against France alone, and signed the treaty of Utrecht. He died on Aug. 3, 1720.

Heinsius, DANIEL (1580-1655). Dutch scholar. Born in Ghent, June 9, 1580, he became the favourite pupil of Scaliger and professor of Greek and Latin at Leyden, 1605. He wrote Latin poems and

edited Hesiod, Theocritus, Terence, and Livy. He published his Latin Orations, 1609-21; a tragedy, *The Massacre of the Innocents*, 1613; Poems in 1616. He died at The Hague, Feb. 25, 1655.



Daniel Heinsius,
Dutch scholar

His son Nikolaas (1620-81), born at Leyden, July 20, 1620, was a great traveller and collector of MSS. He edited a number of Latin classical authors, in which he proposed a vast number of not always felicitous emendations, which gained him the sobriquet of Restorer of the Latin Poets. He died at The Hague, Oct. 7, 1681.

Heinz, HENRY JOHN (1844-1919). American manufacturer. Born of German parents at Pittsburgh, Oct. 11, 1844, he began his business career at the age of eight, peddling produce from the family garden. While working in his father's brickyard, he extended his market gardening activities, founding in 1869 a firm (bankrupt 1875) to sell graded horseradish. In 1876 he founded H. J. Heinz & Co., manufacturers of pickles, condiments, and prepared foods, and, inventing the slogan of "57 varieties" in 1896, made it the biggest concern of its kind. A pioneer in welfare among employees, Heinz died May 14, 1919.

Heir. Term in English law. Up to 1926 the heir was the person who succeeded to an estate of inheritance—to the real property of a deceased person as distinct from his other property which passed according to different rules to the next of kin. As a result of Acts passed in 1925, altering the rules of succession and abolishing the distinction for that purpose between real and personal property, the heir lost almost all importance. The old rules for determining the heir still apply, however, in the case of the title to the throne, to a peerage, etc.

An heir apparent is a person who if he survives must be heir, e.g. the eldest son. An heir presumptive is a person who, if the present holder of the dignity died today, would be his heir, but if the present holder lives may possibly be defeated by the coming into existence of another heir. Thus a childless man's brother may be his heir presumptive, but, should the man have a son, the son will be heir apparent.

Heirloom. Chattel which by English law descended along with land by custom or settlement to the heir of an estate, instead of to the next of kin of a deceased person like other chattels. Since 1925, heirlooms do not descend direct to the heir but pass in the first place to the personal representatives of the deceased, although from them they will pass to the person who takes the land. Thus it is still possible to provide that certain chattels shall pass with certain land.

The tenant for life of an estate may sell heirlooms with the permission of the court; but this will be granted only when the sale is for the benefit of the estate. Chattels frequently made heirlooms are the garter and collar of a knight; family jewels (e.g. the Hope diamond); a patent creating a dignity; arms and armour. The word is a compound of heir and loom (A.S. *geloma*) originally meaning any tool or utensil.

Heisenberg, WERNER (b. 1901). German physicist, born Dec. 5, 1901, at Munich. After studying at Munich and Göttingen, he became a lecturer at Copenhagen 1926, and professor of theoretical physics at Leipzig in 1927-41. There he created the system of quantum mechanics and performed research in atomic energy, the Zeeman effect, and the principle of indeterminacy which he had found. In 1932 he was awarded the Nobel prize for physics. Director of the Max Planck institute of physics, Berlin, 1942-45, he later held a chair of physics at Göttingen.

Hejaz or HEDJAZ. District of Arabia, part of the kingdom of Hejaz and Nejd, a personal union of the two countries known as Saudi Arabia; the sultan of Nejd being also king of the Hejaz. With a pop. estimated at 3,500,000 and an area a little larger than that of Great Britain, the Hejaz lies to a depth of some 200 m. along the E. coast of the Red Sea for nearly 700 m., and stretches from Akabah on the N. to Asir on the S., its boundaries on the E. being Great Nejd, Nejd, and the Great Arabian Desert.

It owes its importance to the Holy Cities of Mecca and Medina, from the latter of which the Hejaz rly., built 1901-8, runs N. to Damascus, a distance of 1,105 m. Originally constructed by Turkey on the plea that it facilitated the haj or pilgrimage to the Holy Cities, this line was also politically and strategically valuable. In Arabia,

however, the Arabs, even under Turkish rule, had a large measure of independence, and Turkey retained such authority as she possessed more by subsidising the local chiefs than by armed force, except in the towns, along the rly., and at the ports.

Besides Mecca and Medina, the towns of the Hejaz are Jeddah and Yanbu or Yenbo, the ports respectively of these two cities, and Taif, in the S., the centre of the Arabia Felix of old. In these cities and towns live the greater part of the pop. The country is mainly a raised plateau, whose W. side is formed by rugged mountains that descend sharply to the Red Sea. Lacking perennial rivers, the land is fertile only in its few valleys. The annual haj, with some 60,000 pilgrims in normal times, is the chief source of what wealth the Hejaz possesses. A British company works ancient gold mines.

At the outbreak of the First Great War, the Hejaz was a vilayet of the Turkish empire. When Turkey entered the war the situation in Arabia was quiet, except in Nejd and in Asir, which were in open revolt; in the Yemen the Turks took the offensive against the British in Aden. The Young Turks, led by Djemal Pasha, governor of Syria, arrested and executed in 1916 many Arabs in Damascus and Hama. Enver Pasha visited Mecca and shocked the faithful there by his atheism. On June 5, 1916, the grand sheriff of Mecca, hereditary keeper



Hejaz. Map of the region in which are situated the holy cities of the Mahomedan faith

of the holy places of Islam, proclaimed himself king of the Hejaz under the title of Hussein Ibn Ali; and was recognized by the Allies and the Arabs. He thereupon summoned the Turkish garrison of the Holy City to surrender, but it held out until June 9. Hussein divided his forces into four: one part remained in Mecca; the second went N. to Medina under the ameer Feisal, one of his sons; the third, under another son, the ameer Abdulla, marched S. to Taif; and the fourth, under yet another son, the ameer Zeid, advanced W. on Jedda. The grand sherif appealed to Great Britain for assistance, and thereafter the Red Sea patrol of the British navy co-operated with his forces. Before June was out Jedda had fallen; Yembo was taken in July, Taif in Sept. The whole of the Hejaz, except Medina, which Feisal failed to take, and the rly. zone, was cleared of Turks.

Further Arab Successes

The Egyptian government sent officers and men to the Hejaz to train the Arabs and others who had joined them from the N. Feisal captured Wejh (El-Wijh) in Jan., 1917, and his force steadily grew into a regular army. He also succeeded in getting all the Arabs in the N., who had been divided by tribal feuds, to support him, among others the sheikh of Howeitat.

During 1917 Feisal made repeated raids on the Hejaz rly., but the chief Arab success of that year was the capture of Akabah in Aug. By April, 1918, Feisal had seized Tafilah, near the S. end of the Dead Sea, and held the latter against a powerful attack. Still Maan and Medina held out. Now the armies of the king of the Hejaz numbered 40,000 men, who became the extreme right wing of Allenby when he conquered Palestine and Syria. Feisal took part in the advance on Damascus, which was entered first by some of his troops on the night of Sept. 30-Oct. 1. Medina capitulated to Hussein, under the terms of the armistice with Turkey, Jan., 1919.

In Oct., 1924, following an unsuccessful war with the sultan of Nejd (*q.v.*), King Hussein abdicated in favour of his son. The latter was forced to abdicate in 1925, when the ruler of Nejd, Abdul Aziz Ibn Saud captured Mecca and proclaimed himself king. Great Britain then recognized the independence of Ibn Saud and the united state of Hejaz and Nejd, now known as Saudi

Arabia. The constitution of 1926 technically operates. A legislative assembly sits in Mecca in an advisory capacity.

In 1939 the Saudi Arabian government reduced all taxes and dues paid by pilgrims to Mecca, and during the Second Great War the governments of Great Britain and India made shipping available with a guarantee to owners against loss. See Arabia; Feisal I; Ibn Saud; Lawrence, T. E.; Palestine, Conquest of; Saudi Arabia.

Hejira OR HEGIRA (Arab. *hijra*). Word meaning flight, applied specially to the flight of Mahomet from Mecca to Medina in A.D. 622, from which event the Mahomedan era is reckoned. This era was inaugurated by the caliph Omar in 639 and is reckoned from July 16—the first day of the first month of the year in which the flight took place. Dates of the Mahomedan era are indicated by the letters A.H. (*anno hegirae*, in the year of the flight). The Mahomedan year is a lunar one, and so about 11 days shorter than the solar year. To find the year in the Christian era approximately corresponding to a year in the Hejira, subtract 3 p.c. from the Hejira year and add 622.

Hekla OR HECLA. Active volcano of Iceland. In the S. of the island, it is about 20 m. from the coast and 70 m. E. of Reykjavik. It attains an alt. of 4,747 ft., having one large crater, $1\frac{1}{2}$ m. in circumference and 200 ft. to 300 ft. deep, and several subsidiary ones. It has been active frequently since the 11th century. The eruption of 1845–46 lasted continuously from Sept. to April. In March, 1878, and again in March, 1947, there were violent outbursts. The principal rocks are composed of basalt and lava; the mountain is devoid of all vegetation.

Hel. In Norse mythology, daughter of Loki. She is described in the Prose Edda as purely evil, care being her bed, hunger her dish, and starvation her knife. In other myths she was the guardian of the plains under the earth, peopled by the happy dead, as well as of the caves of punishment. See Mythology.

Hel OR HELA. Peninsula in Poland commanding the entrance to the port of Gdynia. It was heavily fortified by the Poles and was their last stronghold to fall to the Germans, Oct. 1, 1939, when the garrison of 4,000 laid down their arms after a sea, land, and air attack lasting 30 days. See Poland.

Helder, DEN. Port of the Netherlands, in the prov. of N. Holland. It stands at the N. extremity of the prov., and is separated from the island of Texel by the Mars Diep, a channel 2 m. in width. It is about 40 m. N. of Amsterdam, with which it is connected by the North Holland canal. The place is protected from the sea by a dyke 5 m. long and 40 ft. wide, sloping 200 ft. into the sea. About a mile E. of the town, at the entrance to the North Holland canal, is the harbour of Nieuwe Diep. At Willemsoord are docks and shipyards, a naval cadet school, and a meteorological station.

Formerly a small fishing hamlet, Den Helder developed owing to its position at the entrance to the former Zuider Zee. Off here, in 1673, the Dutch under Tromp and de Ruyter defeated the combined English and French fleets. Den Helder was fortified by Napoleon in 1811. Pop. (1955) 42,782.

Helderberg Formation. Rocks of the Upper Silurian system. They



Hekla. The great volcano of Iceland in a photograph taken during its violent eruption in March, 1947

are found chiefly in the eastern part of N. America, *e.g.* New York (forming the Helderberg range), the Catskills, New Brunswick, Nova Scotia, and Montreal. Varying in thickness up to 600 ft., these rocks are noted for their fossils.

Helen (Gr. *Helenē*). In Greek legend, the woman of surpassing beauty whose seizure by Paris was the cause of the Trojan War; whose face, in Marlowe's line, "launched a thousand ships." According to the earlier stories

she was the daughter of Tyndareus and Leda, Castor and Pollux being her brothers. In a later version, Leda was visited by Zeus in the form of a swan, and gave birth to two eggs, from which Helen and the twins came forth.

Helen became the wife of Menelaus, king of Sparta, and when Paris, son of Priam, king of Troy, came there on a visit, Aphrodite, in fulfilment of a promise to give Paris the most beautiful woman in the world, caused her to fall in love with the handsome visitor. After the capture of Troy, Helen returned to Sparta with her husband, though, according to some legends, they sojourned for eight years in Egypt before reaching home. The word is a favourite feminine Christian name, as are variants Ellen and Helena. The form Helenus is occasionally used as a masculine name. *See* Troy; *consult also* Helen of Troy, A. Lang, 1882; The Legend of Fair Helen, E. Oswald, 1905.

Helena. Capital city of Montana, U.S.A., and the co. seat of Lewis and Clark co. Situated 3,955 ft. high at the foot of the Rocky Mts. on the edge of the upper Missouri valley, it is 65 m. N.E. of Butte, and is served by rlys. and an airport. Among its notable buildings are the copper-domed capitol, the Carroll College (R.C.), a veterans' hospital, the R.C. cathedral, and the Protestant pro-cathedral.

Helena lies in a rich mining region, containing gold, silver, copper, lead, and zinc; its main street is laid out on the site of Last Chance Gulch, where gold was struck in 1864 and \$4,000,000 worth of ore extracted in two years. Forests of fir and pine on neighbouring hills provide timber for large sawmills. Sheep and cattle are reared, and there are a huge lead smelter, foundries, machine shops, brick and tile factories, and breweries. The surrounding Prickly Pear or Helena Valley yields cereals and vegetables. Laid out as a mining town in 1864, Helena became the capital of Montana on its organization as a territory in 1876, and received a city charter in 1881. An earthquake in 1935 caused damage valued at a million pounds. Pop. (1950) 17,581. *Pron.* with accent on first syllable.

Helena, FLAVIA JULIA (d. 328). Wife of the Roman emperor Constantius Chlorus and mother of Constantine the Great. She was born of humble origin in Nicomedia, and became famous for her

devotion to Christianity. In her old age she made a pilgrimage to Jerusalem, and, according to a legend which first appears at the end of the 4th century, she discovered there the sepulchre of Our Lord and the wood of the Cross.

Helensburgh. Burgh and seaside resort of Dunbartonshire, Scotland, on the N. bank of the Firth of Clyde. It is 4 m. N. of Greenock and 24 m. N.W. of Glasgow by railway. The public buildings include the municipal buildings, Victoria



Helensburgh arms

Halls, and Hermitage School; and there is a pier. Helensburgh was founded in 1777 by Sir James Colquhoun, after whose wife it was named. On the esplanade is a monument to Henry Bell, the pioneer of steam navigation, who died here in 1830. The council owns the water supply, four parks, a recreation ground, and the harbour. The beautiful grounds of the Hermitage have been laid out for public use. From Craighend, about 1 m. E., steamers go to Dunoon and other pleasure resorts on the Clyde, and the rly. branches off for Fort William, Mallaig, etc. Pop. (1951) 8,700.

Helensville. Town of New Zealand, in Auckland prov. On the Kaipara river, it is 38 m. by rly. N. of Auckland. Steamers ply from here to various places on Kaipara Harbour and Wairoa river. Pheasant and duck shooting and fishing are available. Near are hot springs with great curative properties. Pop. (1951) 1,110.

Helenus. In Greek legend, son of Priam, king of Troy, noted for his powers of prophecy. Taken prisoner by the Greeks, to whom he declared that Troy could never be taken without the help of Pyrrhus (Neoptolemus) and Philoctetes, after the capture of the city he was allotted to Pyrrhus as part of the spoils. He afterwards accompanied Pyrrhus to Epirus and married Andromachē, the widow of Hector, becoming king of the country after the death of Pyrrhus.

Helford. River of Cornwall, England. Rising 4 m. W. of Penryn, it flows 10 m. S. and E., to enter the English Channel between Rosenmullion Head and Nare Point. There is a ferry across the river, which is visited by oyster fishers and yachtsmen.

Helfrich, CONRAD EMILE LAMBERT (b. 1886). Dutch sailor. He was born Oct. 11, 1886, and educated at the naval academy, Den Helder. He commanded a training squadron, 1934-35, and was director of the naval war college at The Hague, 1938-39. Helfrich had command of Netherlands naval forces in the East from 1939 to 1942, when he became supreme commander of Allied naval forces in the S.W. Pacific and c.-in.-c. of all Netherlands and N.E.A. land, air, and sea forces. In 1945 he was appointed c.-in.-c. of Netherlands naval forces and represented his country at the San Francisco conference.

Heliacal Rising. Of a star, the time at which it rises with the sun. At a given place this will occur once a year, on the date at which the sun in its annual passage round the zodiac passes near the star. The ancient Greeks and Egyptians used successive heliacal risings of bright zodiacal stars to determine the length of the year.

Helicon (Gr. *hēlikōn*). Name sometimes given to the circular bombardon (*q.v.*). The first meaning of the Greek original is the thread spun from the distaff to the spindle, then a nine-stringed instrument.

Helicon (mod. Zagari). Mt. in the S.W. of Boeotia, ancient Greece. Its beautiful scenery caused it to be popularly regarded as the home of the Muses, to whom there was a temple and in whose honour games were celebrated. The well of Asopippe at its foot, and the fountain of Hippocrene were also sacred to them. Remains of the temple, of a theatre, and of a colonnade have been discovered. *See* Mythology.

Helicopter (Gr. *hēlic*, spiral; *pteron*, wing). Direct-lift flying machine on which the wing and propeller of the orthodox aeroplane are replaced by a power-driven rotor or rotors revolving in a horizontal plane. The advantage is that it does not require an initial run along the ground to become airborne, but can take off or land vertically.

Leonardo da Vinci first evolved the theory of the helicopter and made detailed drawings of a projected machine, but the first successful attempt to solve the problem of vertical flight was not made until 1923, when a Frenchman, Cehmichen, built a machine that succeeded in hovering for five minutes. This consisted of an oblong, semi-rigid balloon from

which was suspended a framework with two cross arms, at the ends of which were four horizontal power-driven rotors. There were seven other air-screws to assist manoeuvrability and stability.

In 1924 the marquis of Pescara designed and flew a helicopter with two superimposed horizontal rotors revolving in opposite directions and driven by a 180 h.p. Hispano-Suiza engine. The longest flight made lasted half an hour. Another helicopter that achieved some success was built by an Austrian, Asboth; it was lifted by two rotors and controlled by a series of flaps.

In 1930 an Italian, D'Ascanio, built a helicopter fitted with two twin-blade rotors 39 ft. in diameter and powered by a 95 h.p. Fiat engine. The machine set up a helicopter record by flying in a closed circuit of one mile for ten minutes. In 1933 a helicopter called the Florine remained in the air 9 mins. 58 secs. The rotors, 24 ft. in diameter, were mounted one at each end of the fuselage and driven by a 200 h.p. engine.

Following the success of Juan de la Cierva's Autogiro (*q.v.*), development of the helicopter was temporarily suspended. During the



Helicopter. The Westland-Sikorsky S 51 demonstrating its ability to land in a car park, June 11, 1947

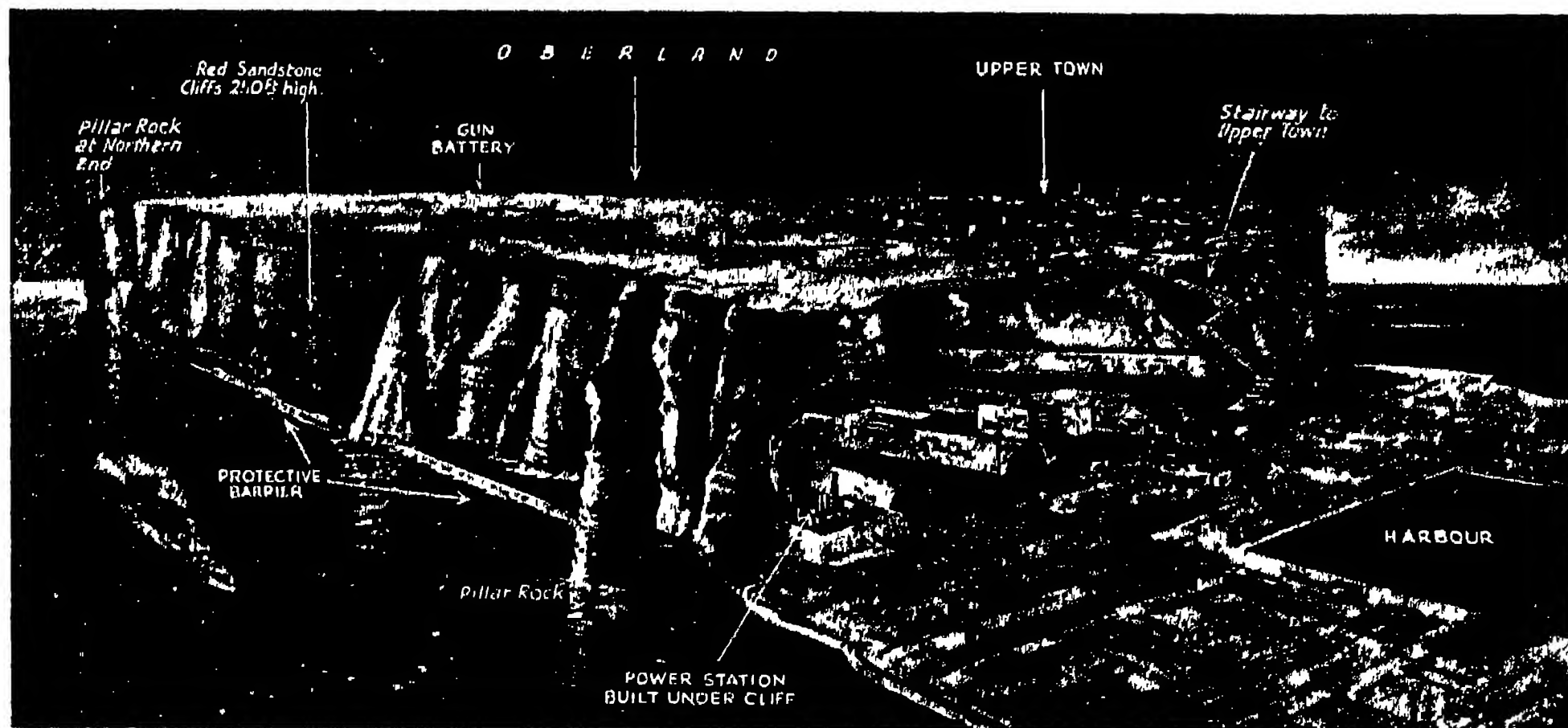
Second Great War experiments with true helicopters were revived, particularly in the U.S.A., with a view to building a military machine that would be independent of airfields and able to hover for artillery spotting. The U.S. navy used helicopters for coastguard rescue work and to a limited extent for war. Postal authorities in the U.S.A. use them for mail deliveries between city post offices. The first helicopter mail service in Great Britain was inaugurated on Aug. 12, 1947, when two helicopters flew the King's mail from Dyce airport, near Aberdeen, to Balmoral castle. The world's first helicopter passenger service (Liverpool-Car diff) opened 1950; first transatlantic flight by helicopter was completed July 15-31, 1952.

Heligoland OR **HELGOLAND**. Island in the North Sea, about 44 m. N.W. of the mouths of the Weser

and Elbe. Rocky and with an elevation of about 190 ft, it has an area of $\frac{1}{2}$ sq. m.; its circumference is about 3 m., having been steadily reduced by erosion from 120 m. in 800 and 45 m. in 1300. Limestone and sandstone cliffs rise sheer from the ocean on all sides except the S.E., where there is a flat bank of sand called the Unterland. It was much visited for its sea-bathing facilities, and supported a pop. of Frisian fisher-folk and pilots.

Great Britain took Heligoland, which means holy land, from Holstein in 1807. In 1890 she ceded Heligoland to Germany in exchange for recognition of rights in Zanzibar. Germany converted the island into a strategic strong point of her coastal defence system. Artificial cliffs were constructed to prevent further erosion and the area of the island increased by deposits of material obtained from dredging the Elbe. A naval harbour was built, Zeppelin sheds erected, and batteries of heavy coastal artillery installed.

With Sylt and Borkum, Heligoland formed an almost impregnable defence line across Heligoland Bight and provided cover for the ports of Emden, Wilhelmshaven, Cuxhaven, and Hamburg and the Kiel Canal. By the treaty of Versailles, Germany was compelled to demilitarise Heligoland, which again became a pleasure resort. It had always been noted for migrating birds, and in 1926 a marine ornithological station was built in the lower town and a bird-watching station established above the upper town. When



Heligoland. Drawing showing how Germany had converted the island into an elaborate fortress. There were over 8 miles of tunnels, used as storage depots, hospitals, etc. During the raids preceding Germany's surrender, both upper and lower towns were obliterated by R.A.F. bombs. All fortifications and armaments were totally demolished April, 1947

Drawing by R. G. Lambert, courtesy of "The Sphere"

Hitler assumed power, these ornithological activities were used as a screen for the rearmament of the island.

By 1939 it had been completely refortified and from the outbreak of war was used as a base for sea and air minelayers, and for air attacks on Great Britain and her shipping. During the Second Great War, some 14 m. of concrete-lined tunnels were built for storage, massive concrete U-boat pens were erected, batteries of 12-in. and 18-in. guns installed, an underground hospital built, and a radar station set up. Although an aerodrome was laid out, the prevailing winds limited the island's usefulness as an air-base, and it had to depend for defence upon the fighter stations on Borkum and Sylt.

The German fleet in Heligoland Bight was bombed by the R.A.F. on Sept. 29, 1939; and on Dec. 3 direct hits were made on warships off Heligoland. After numerous attacks in this area on German warships and submarines, in 1944 the civil population was removed by the German authorities. Heligoland was attacked by nearly 1,000 bombers on April 18, 1945, a second heavy assault being carried out on the 19th. British troops landed on May 14, when the garrison surrendered. The town of Heligoland had been completely destroyed and an area of the Oberland a mile long and half a mile wide had been flattened. The U-boat pens and gun emplacements of re-inforced concrete had suffered only slight damage.

On April 18, 1947, fortifications, tunnels, U-boat pens, and gun emplacements were destroyed in a single explosion by the Royal Navy, over 6,700 tons of explosives being used. It was the largest explosion since the atomic bomb detonated at Bikini, and was registered on over 100 seismographs in different parts of Europe. Apart from destroying the fortress, this explosion served as a useful artificial earthquake for scientific investigation. At Kew Observatory, records from the instruments showed distinct movements which allowed of the exact calculation of the travel times of waves set up in the earth's crust. The first wave arrived at Kew after 1 min. 23 secs. while Paris reported the first wave as arriving 1 min. 40 secs. after the explosion.

Heligoland, BATTLE OF. Naval engagement of the First Great War, between ships of the British and German fleets, in the Heligo-

land Bight, Aug. 28, 1914. Commodore Tyrwhitt, in command of the British light cruisers *Arethusa* and *Fearless* and 33 destroyers, and Commodore R. Keyes, commanding eight British submarines, swept the bight in the early morning, manoeuvring to cut off German light craft from their bases. About 20 m. from the Elbe nine German destroyers were disposed in a defensive semi-circle supported by light cruisers. Breaking the cordon, the British engaged two light cruisers. A German destroyer was disabled and had to be sunk by her crew to avoid capture. Further German light cruisers, making six in all, made an effort to cut off the British and closed in; and for an hour or so Tyrwhitt and Keyes were hard pressed.

The ships of the first light cruiser squadron, under Commodore Goodenough, now entered the fight; and shortly afterwards five British battle cruisers of Sir David Beatty's squadron—*Lion*, *Queen Mary*, *Princess Royal*, *Invincible*, and *New Zealand*—also intervened, sinking the German light cruisers *Mainz*, *Köln*, and *Adriadne*. Each of the last two was sunk by two salvoes from *Lion*. All but one of the crew of *Köln* perished. The total German losses were three light cruisers and one destroyer, with 712 killed, 149 wounded, 379 captured. The British casualties were 31 killed, 52 wounded, with *Arethusa* much damaged but soon repaired. The German official history, while criticising British dispositions, admitted that this reverse produced a bad moral effect in the German navy. Consult *Naval Operations*, Sir J. Corbett, vol. 1, 1920.

Heliodorus. Greek writer of romance. Born at Emesa in Syria, he was the author of *Anthiopia*, a long love story in ten books, the beginning and the end of which are laid in Ethiopia. Dealing with the adventures of Theagenes and Chariclea, in plot and characterisation it is the best of its kind and commendably free from indecencies. Erroneously attributed to Heliodorus, bishop of Tricoa in Thessaly (c. 490), it is probably the work of a sophist who lived at the end of the 3rd century A.D.

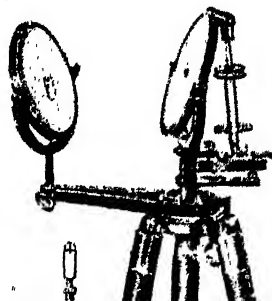
Heliogabalus. An alternative spelling of the name of Elagabalus (q.v.), Roman emperor.

Heliograph (Gr. *helios*, sun; *grapho*, I write). Instrument consisting of a mirror capable of revolution, and so of reflecting the rays of the sun or of some artificial source of light over considerable distances. It is used principally for military signalling, especially in mountainous districts, and its messages are conveyed by long and short flashes in the Morse code.

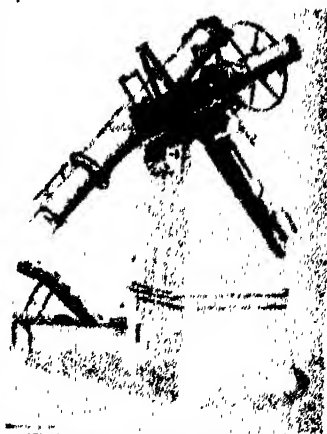
Heliograph signalling has been carried out at a distance of 70 m.;

it is practically secret and extremely rapid in operation. A heliograph cannot be read by anyone more than a few yards off the exact alignment. See Signalling.

Heliometer. Telescope used for accurately measuring small angular distances, e.g. the separation of the components of a double star, or the angular diameter of the sun. The lens of the telescope is split



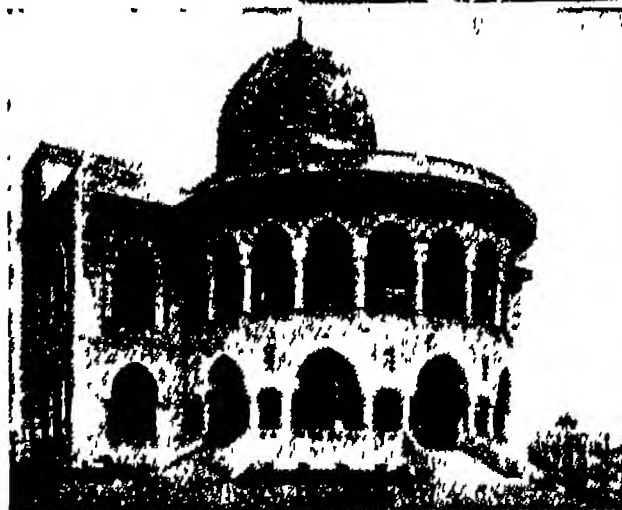
Heliograph. Cavalry type with 8-inch mirrors
Courtesy of J. H. Steward



Heliometer at the Radcliffe Observatory, Oxford, for making accurate astronomical measurements
By courtesy of the Clarendon Press

along a diameter, and the two halves are movable along this diameter by means of a micrometer screw. Two images of any celestial object are thus produced with a separation which can be adjusted for making the measurement. Heliometers were used for the early measurements of stellar distances, but since the introduction of photography they are used less

Heliopolis (Gr. City of the Sun). Town of ancient Egypt, the chief seat of religious learning, formerly containing a famous university for the education of the priests. The On of the Bible (Gen. 41, v. 45), it was the Egyptian Iunu. Parts of the great temple of the sun and one obelisk of red granite, 66 ft. high, remain. Cleopatra's needle (London) formerly stood here,



Heliopolis, Egypt. Mosque in the New Town. Above, granite obelisk of Senusert I (c. 1950 B.C.)

with its fellow, now in New York. Modern Heliopolis, a northern suburb of Cairo, has a cemetery of British and Commonwealth dead of the Second Great War.

Helios. In Greek mythology, god of the sun, identified in later times with Apollo, and sometimes called Hyperion. He crossed the sky day by day from east to west in a chariot drawn by four horses.

Helio-stat (Gr. *hēlios*, sun; *statos*, fixed). Mirror mounted on an axis parallel to the axis of the earth and moved by clockwork so that it rotates with the same angular velocity as the sun, the image of which it reflects. In short, it follows the sun, and in consequence the rays of the sun when reflected from it pass always in a fixed direction. Foucault's heliostat reflects the sun's rays horizontally. Heliostats are used in spectroscopy.

Heliotrope (*Heliotropium peruvianum*). Perennial plant with shrubby stem, family

Boraginaceae. A native of Peru, it has broad lance-shaped wrinkled and hairy leaves, and clusters of fragrant (cherry pie) lilac or dark-blue flowers.

Heliotrope (Gr. *hēlios*, sun; *tropos*, turn). Instrument for making long distance geodetic surveys by means of reflected sunlight. It consists of a mirror moved by a clockwork motion so that it follows the sun's apparent motion, and, at a particular hour of the day, arranged beforehand, reflects the light of the sun directly to the distant point where the surveyor is taking his sights. By graduated scales on the sighting base, the surveyor is able to fix heights and distances from the reflection. The heliotrope was developed from the heliograph.

Heliotropin OR PIPERONAL ($C_8H_6O_3$). White crystalline substance, with the odour of heliotrope, used as a perfume for soaps and toilet preparations. It is made by oxidising oil of sassafras. Chemically it is the methylene ether of pyrocatechic aldehyde. The crystals dissolve in spirit, and it is this solution which is used as a perfume. Heliotropin is also used in medicine.

Heliotropism (Gr. *hēlios*, sun; *trepein*, to turn). The bending of part of a plant in relation to the light incident upon it. Most shoots are positively heliotropic (bend towards light). This may be easily seen in the plants on the edge of a thick wood or under a hedgerow, or in pot-plants grown in a window. Few roots are sensitive to light. The effect of unequal illumination around a shoot is to reduce the auxin concentration in the part most brilliantly illuminated and so to depress the rate of growth of that side, with the result that the shoot makes a growth curvature towards the light.

Helium. Chemical element, a colourless inert gas with a density of 0.7185 g. per l. at NTP, or just under twice that of hydrogen.

Atomic no. 2, at. wt. 4.003. It was first discovered when Janssen detected a new yellow line in the spectrum of the sun's chromosphere during the eclipse of 1868, and Frankland and Lockyer concluded it must be a new element: hence the name, from Gr. *hēlios*, the sun. Its terrestrial occurrence was discovered by (Sir) William Ramsay in



Heliotrope or Cherry Pie. Fragrant flower clusters

1894 when he was searching for argon in the mineral cleveite. Traces have since been found in other uranium-bearing minerals, in a number of mineral springs, and in the atmosphere (about seven parts by weight in ten million). But the only practical sources are certain natural gas supplies in the states of Kansas, Texas, and Oklahoma, U.S.A., from which the helium is extracted by liquefaction of the other gases.

Helium itself has the lowest boiling-point of all the elements: -268.98°C. or about $4.18^{\circ}\text{Kelvin.}$ It was liquefied in 1908 by Kamerlingh Onnes at Amsterdam, who went on to reach a temperature slightly below 1°K. by evaporating the liquid under reduced pressure. Temperatures as low as 0.01°K. have been reached by magnetic methods.

Liquid helium can be solidified by a combination of intense cold and pressure: its melting point was given by Keesom in 1926 as -272°C. (1.16°K.). Without pressure, helium remains liquid to the lowest known temperatures. At 2.19°K. , however, it changes to a state called helium II, which exhibits the unique property of superfluidity. Its internal friction (viscosity) becomes negligible, so that it flows freely through narrow capillaries, and climbs up the sides of its container (and any other available surfaces) in a film about 100 atoms thick. At the same time its heat conductivity becomes very great, so that a heat impulse applied at one point travels through the liquid as a form of wave motion which has been somewhat misleadingly named "second sound." The speed of transmission of these waves is at a minimum of about 60.4 ft. per sec. at 1.1°K. rising to some 500 ft. per sec. at or near 0.1°K.

The nucleus of the normal helium atom consists of two protons and two neutrons, and is thus identical with the α -particle of radio-activity (*q.v.*). Hence the presence of helium in radio-active minerals, where the proportion of helium to uranium may give a clue to the age of the rock. An isotope with only one neutron, helium-3, occurs naturally in the proportion of about one part in 10,000.

Helium was first used for filling low temperature gas thermometers and electric light bulbs. During the First Great War it was discovered that a mixture of 15 p.c. hydrogen and 85 p.c. helium constituted a non-inflammable gas of

exceptional buoyancy, and it became the ideal inflator for balloons and airships. As a result, the U.S. government took over control of all helium production, reserving to itself the gas as a munition of war. Not until 1937, when the development of heavier-than-air machines appeared to render airships obsolete as offensive weapons, did congress pass legislation permitting the sale of surplus helium to any U.S. industry requiring it. Export abroad remained prohibited.

Following the destruction by fire of the Zeppelin Hindenburg (*q.v.*) at Lakehurst, N.J., in 1937, the German government requested permission to purchase helium for inflating airships. This was refused on the grounds that the gas might be used for military experiment. Efforts were then made to find alternate sources of supply. In 1938 traces were found in São Paulo, Brazil, but despite the expenditure of German capital and the assistance of German scientists, the deposits did not justify their being worked. Other deposits occur in Alberta and Ontario, the gas being extracted by a refrigeration process developed from Claudet's liquid oxygen producing apparatus.

Helium is essential in the welding of light metals derived from magnesium. By projecting a nozzle spray of helium when welding steel, the oxygen is absorbed and oxidation prevented. Helium mixed with the oxygen breathed by divers while working under water dissolves the minute bubbles liberated in the blood stream which cause "bends." Until helium-oxygen mixtures were used, divers could not operate at a greater depth than 300 ft., but they can now go to 600 ft. A mixture of helium and oxygen is used in the treatment of asthma, and the gas has been invaluable in relieving pneumonia, and in aiding infants whose lungs fail to expand normally at birth. Helium gives the yellow colour to neon signs. *See* Radium.

Helix (Gr., spiral). Genus of land gastropodous molluscs. The common snail (*H. aspersa*) is a familiar example. All snails of this genus have conical, globular, or depressed shells. The genus includes over 4,000 species, distributed all over the world. *See* Snail.

Hell. In modern English, place or condition of punishment for impenitent sinners after death or after the final judgement. In the Authorised Version of the Bible it

had the wider meaning of the place of the departed. The R.V. has distinguished between Hell and Hades. It should be noticed that the clause in the Apostles' Creed, "He descended into Hell," should be "He descended into Hades" or the realm of departed spirits.

The idea of a place of punishment for the wicked after death is an obvious corollary of the belief in a future reward for the righteous, and is found in most religions which have developed beyond the primitive stage. In some, however, the belief in retribution takes the form of the idea that the wicked are reborn in a lower grade of life. The word Hell in the Bible is equivalent to Gehenna, which is itself derived from Hinnom, the name of a valley near Jerusalem associated with heathen rites. It became a place where refuse was deposited and constant fires were kept burning. Hence the name was adopted for the place of torment for the wicked. The idea of retribution for the individual after death is not prominent in the O.T. The Apocalyptic writings, of which Daniel is an example, were the first to lay great stress on a final judgement and retribution.

At the time when Jesus began to teach, the belief was widespread. There can be no doubt that Jesus and the N.T. in general teach that impenitent sinners are punished in the future life. Considerable controversy, however, has taken place on the question whether this punishment is eternal. Many theologians, feeling that such a doctrine would contradict the thought of God as a loving Father, maintain that Jesus meant not an eternal punishment but an "age long" punishment. Others interpret literally S. Paul's words, like Drummond in *Natural Law in The Spiritual World*, "the wages of sin is death," and have argued that the fate of sinners who are finally impenitent is annihilation.

The Roman Catholic Church still holds to the doctrine of Hell developed by the medieval church which was greatly influenced by Augustine. According to this even unbaptized infants and virtuous pagans are in Hell. The severity of this view is, however, greatly mitigated by the belief that there are different regions in Hell, that of "Limbo," which is assigned to unbaptized infants, not being a place of

torment. Among other Christians the doctrine of Hell has fallen into the background.

This is largely due to a change in our conception of the purpose of punishment. The older view, that retribution is an end in itself, is giving way to the view that the object of punishment should be reform and prevention. For this reason it would be true to say that among many modern Christians the idea of Hell is being transformed into that of a state of further probation and purification, i.e. Purgatory. Whatever modifications the idea of Hell may undergo in the light of modern thought, the belief in a future punishment of the wicked corresponds to a demand of the conscience and emphasises the vital importance of the struggle against evil. It cannot therefore be safely eliminated from the Christian faith. *See* Gehenna; Purgatory; Sin; Theology.

W. R. Matthews, K.C.V.O., D.D.

Hellanicus (c. 480-405 B.C.). Greek logographer. Like his predecessor Herodotus (*q.v.*) a great traveller, he was the author of works on genealogy and chronology, and on the history of various countries, including a brief sketch of political events. The most important were *Attica*, a history of Attica down to the Peloponnesian war, and lists of the priestesses of Hera at Argos and of the victors in the games at the Spartan festival *Carnea*, both valuable for chronology.

Hellas. Originally a small district of Thessaly inhabited by Hellenes, the supposed descendants of the legendary king Hellen, son of Deucalion. The name afterwards came to be applied by the Greeks to all places inhabited by those of their race. Hellas thus included not only Greece proper, but the Greek cities of Asia Minor and Sicily, and even distant colonies such as Massilia (Marseilles), and those on the Pontus Euxinus. *See* Greece.

Hellebore (*Helleborus*). Genus of perennial herbs, members of the family Ranunculaceae. They are natives of Europe and N. and W.

Asia. They have large leaves deeply cut into lobes which are arranged finger-fashion. The showy parts of the flowers are the sepals, which are coloured, whilst the petals are converted into small nectar-tubes. Owing to their stimulating



Hellebore. Flowers and leaves of *H. foetidus*

cathartic, and narcotic properties they were formerly used in medicine. *H. niger* is the so-called Christmas rose; *H. foetidus*, stinking hellebore or setterwort; and *H. viridis*, the bear's-foot.

Helle Fjord. Inlet of the Atlantic Ocean, on the coast of Norway, between Bergen and Trondhjem. On the night of Jan. 6-7, 1942, light British naval forces entered Helle Fjord, sinking a German supply vessel and two trawlers which were alongside a German canning factory, the latter also being damaged.

Hellenic Studies, SOCIETY FOR THE PROMOTION OF. Founded in 1879 by a number of scholars interested in the subject. Its object is to promote the study of everything connected with the language, literature, and art of ancient and modern Greece, particularly the results of modern research and excavations. The Journal of Hellenic Studies, issued by the society, contains an account of the researches and matters concerning Greek life. Its offices are at 50, Bedford Square, London, W.C.1.

Hellenism. Term applied to the school of culture which sought models of artistic expression in the art of ancient Greece. Its chief characteristics in the best period, both in art proper and in literature, were restraint and a sense of proportion and harmony. See Classical Education; Greek Art; Greek Language and Literature.

Hellenist (Gr. *hellēnistēs*). Term meaning literally one who speaks or writes pure Greek, then one who affects the use of Greek manners, modes of thought, or language. It was specially applied to those Jews who adopted Greek as their language, and afterwards to any non-Greek who did the same.

Heller (originally Haller). Once widely circulated Continental coin which took its name from Hall, in Swabia, where it was minted with locally mined silver in the 13th century. Reduced later to the value of about a halfpenny, it became a copper coin in Germany, Austria, Hungary, and Switzerland in the 19th century. It was given up in Germany, 1873; Switzerland, 1850; Austria, 1924. Renewed in Hungary as $\frac{1}{100}$ of a pengo, and in Czecho-Slovakia from 1921 as $\frac{1}{100}$ of a crown, it was the smallest coin in both countries until after the Second Great War.

Heller, STEPHEN (1814-88). A Hungarian pianist and composer. Born at Pest, May 15, 1814, he studied with Halm in Vienna, and

early made his début as a pianist. He lived in Paris from 1838, where he became known as teacher and composer. His first publication was a set of variations in 1829, and his last three *feuillets d'album*, about 1884. He wrote piano studies, preludes, a popular tarantella, and *pensées fugitives* for piano and violin. He visited England in 1850 and 1862, and died in Paris, on Jan. 14, 1883.



Stephen Heller,
Hungarian pianist

Helles, CAPE, OR HELLES BURNU. A promontory at the south extremity of the peninsula of Gallipoli, Turkey, near the entrance to the Dardanelles. The beaches adjacent were utilised as landing places for troops at the beginning of the Gallipoli campaign in 1915. There is a lighthouse on the point. A memorial has been erected to 20,752 missing troops of the First Great War. See Gallipoli, Campaign in.

Hellespont (mod. Dardanelles). In ancient geography, strait separating the Thracian Chersonese from Asia. It was supposed to have derived its Greek name Hellespontos (sea of Hellē) from Hellē, daughter of Athamas, who in her flight from her stepmother, Ino, on the ram with the golden fleece, fell into the sea and was drowned. Its width varies from 6 m. to less than 1 m., its narrowest part being between Sestos and Abydos (*q.v.*). Hellespontos was also the name of a province, consisting of N. Mysia, in the reign of Diocletian. See Dardanelles; Leander.

Helleu, PAUL CÉSAR (1859-1927). French painter and etcher. Born at Vannes, Dec. 17, 1859, and taught by Gérôme, he began by painting old churches and landscapes. A Study of Versailles is in the Luxembourg. Later he turned to portraits in dry-point of fashionable women: the duchess of Marlborough, the countess of Warwick, and the duchess de Noailles. Delicate and graceful, these tinted etchings aroused much attention at the International Society's exhibitions and elsewhere. Helleu died in Paris, March 24, 1927.

Hellevoetsluis. Seaport and fortress of the Netherlands. It lies in the prov. of S. Holland, on the S. coast of the island of Voorne, on the Haringvliet, an arm of the Ems estuary, about 18 m. S.W. of Rotterdam, with which it is con-

nected by steam tramway, and also by the Voorne canal. It is an important base of the Dutch navy, with extensive docks, arsenals, engineering shops, etc., but the town has little other interest. Here William III embarked for England in 1688. Pop. 2,000.

Hell-Fire Club. Name given to a society of profligates founded by Sir Francis Dashwood (1708-81) and including Lord Sandwich, Lord Orford, and John Wilkes. They indulged in riotous orgies at the old Cistercian abbey of Medmenham, Bucks. The club was dissolved in 1763 after Wilkes had endangered Orford's sanity by releasing, during a prayer to the devil, a baboon dressed as Satan.

Hell Fire Corner. Landmark one mile from Ypres, Belgium, on the road to Menin. It was so named because British troops in the First Great War, going up from Ypres to the advanced trenches, were continually shelled by the Germans at this point.

The same name was applied to Dover during 1940-44 on account of the Germans' cross-Channel shelling of that port.

Hell Fire Pass. Name given by men of the British 8th army to Halfaya (*q.v.*).

Hell Gate. Narrow channel in the East River, New York, which has menaced vessels sailing S. from Long Island Sound to New York harbour because of its rocks and the difference in the river's two tides running turbulently at this point. Operations to remove the rocks began with unsuccessful surface blasting in 1851 and proceeded with steam drilling, blasting, and dredging, until the removal of Flood Rock in 1885 doubled the channel's navigable capacity, making it 200 ft. wide at its narrowest and giving Hell Gate a depth of 26 ft. In the days of sailing vessels, one out of every 50 that ventured through Hell Gate was seriously damaged.

Over Hell Gate are two bridges: a unit of the Triborough bridge which connects Manhattan, Bronx, and Queens, constructed 1935, and the New York connecting railroad bridge, 1917, which allows the only continuous direct rly. route from New England to the S. and W. The name is derived from Dutch *Hellegat* (beautiful pass), once applied to the whole river. Hell Gate pilots' association keeps watch for foreign vessels from its station at Belden Point on City Island, and when one is sighted coming down the Sound, a pilot goes aboard and guides her through.

Hellin. Town of Spain, in the prov. of Albacete. It stands near the river Mundo, on the Murcia-Albacete rly., 34 m. S.S.E. of Albacete. It has ruins of a Roman fort, and a church noted for its fine vaulting and marble pavement. It manufactures woollen and leather goods, pottery, etc., and trades in wine, oil, and saffron. At Minas del Mundo, 12 m. S., are famous sulphur mines (now state property), once worked by the Romans, and in the vicinity, at Azaraque, are mineral springs. Pop. (1950) 30,026.

Helliland. Name given by the Norse voyagers of the 11th century to a district in N. America visited by them. It means the land of flat stones. Various opinions have been expressed by scholars as to its exact whereabouts, but it was probably Newfoundland.

Helm (Ger. handle). Apparatus by which a ship is steered, and which in the 13th century replaced the single oar hitherto used. Although the term helm refers to the actual rudder alone, it is frequently used for the rudder, wheel, or tiller. On large vessels, such as liners or warships, the helm is power-operated from the wheelhouse. (See Ship.)

The term is used in heraldry for a helmet (*q.v.*).

Helmand. River of Afghanistan. It rises in the Hindu Kush, some 140 m. W. of Kabul. After a course of about 700 m., it falls, by several mouths, into Lake Helmet, in S.W. Afghanistan.

Helmet. Defence for the head in fighting. The helmet of the Greeks was usually open in front; some examples show a fixed plate pierced for eyes and nose which by tilting the whole helmet forward could be brought into position, but this was at best a cumbersome contrivance. The Greeks favoured a high crest of horsehair, but the Romans, while adopting the general lines of the Greek headpiece, were content with a much smaller crest, frequently a mere button or knob. Assyrian, Egyptian, and Etruscan helmets were planned on the same general principles though differing in design, and, like the Greek, were frequently ornamented with rich decoration.

After the fall of the Roman Empire, the helmets of Central Europe were cruder in manufacture, frequently mere caps of toughened leather, or of plates of bronze or iron riveted to a ring. The pointed helmet of the Normans was of this nature, but it was

generally provided with a strong nasal or nose guard, of large proportions, attached to the base of the ring. From this time the design of the helmet progressed; sometimes it was a small, close cap of steel, and sometimes a broad-brimmed defence. The great helm of the 13th century was of barrel form, with a flat top which was impractical as providing no glancing surface to the opposing weapon. At the end of the century we find the more practical sugar loaf helmet.

The 14th century helmet had a rounded top with a projecting face plate and a narrow vision slit. In jousting helmets this slit was so placed that the wearer could see out of it only when bent forward with lance in rest ready for his course. The popular type was known as the bascinet, a light pointed helmet, sometimes with a visor pivoted to the sides, and generally attached to the carnil or coif of mail by staples and laces. In the 15th century we find the salade commonly in use; this was similar in design to the modern sou'-wester, with fixed or pivoted visor, and adjustable beaver, or chin piece. From this latter was evolved the armet or close helmet, which completely encased the

head, and had movable pieces to cover eyes and mouth. From this was evolved the simpler burgonet.

When full armour was discarded light open helmets came into favour. Those of the 15th and 16th centuries were bolted to the cuirass back and front, presenting a smooth surface to any weapon.

With the introduction of gunpowder and the increased penetrating power of firearms, helmets fell into disuse. They were not worn by infantry in action after the Civil War in England. They were, however, retained by cavalry, who were more likely to be engaged in sword fighting. In the 18th century a type based somewhat on the ancient Greek form was adopted for heavy cavalry by most European armies, and this later gave place to the plain helmet worn by dragoons. The spiked helmet introduced into the Prussian army in 1860 was eventually adopted by the British as full dress headgear for line infantry regiments; and in a modified form by the British police. A variation of the crested cuirassier helmet worn by British fire brigades early in the 19th century was replaced by the military shrapnel helmet during the Second Great War.

The British shrapnel helmet introduced into the army in 1916 to reduce the number of casualties from head wounds was based on a 15th century model. It was copied by the U.S. army. The French casque or shrapnel helmet was a compromise between the morion and cabasset, while the German version was practically a direct copy of the salade, but without visor or chin piece. Shrapnel helmets underwent little change during the Second Great War, except that the American approximated more to the salade type, and some British and Canadian units were provided with a narrow-brimmed close-fitting cap-type helmet.

In heraldry, the helmet is generally called a helm, sometimes spelt heaume and the



Helmet. 1. Ancient Greek helmet. 2. Roman gladiator's helmet. 3. Norman helmet, 11th cent. 4. Heaume and crest of the Black Prince, 14th cent. 5. Visored bascinet, and camail, French, c. 1400. 6. Salade, German, second half of 15th cent. 7. Tilted helmet, German, c. 1485. 8. Comb morion, English, 16th cent. 9. Helmet of trooper of Life Guards, 1815. 10. British helmet of the two Great Wars

first type represented was cylindrical, with square or flat top; then came the round. In early art



Helmet. The heraldic helmet

the helmet was always represented disproportionately large as compared with the shield, and was placed indifferently full face or in profile. Gradually rules were introduced, the open visored helmet being reserved for princes and nobles and the closed for lesser folk. Modern practice enjoins that the sovereign and princes of the blood should have a helm of gold, with seven-barred visor (grilles), placed full face, or affrontée.

A peer has a silver helmet, with five golden bars, in profile to dexter; baronets and knights a steel helmet, represented in painting by light blue or grey, full faced, with open visor; esquires and gentlemen of coat armour, a steel helmet in profile, with closed visor. No woman, except a sovereign, is entitled to the helmet. See Armour; Casque; Celt, col. plate; Crest; Heraldry; Mantling.

Helmet Shell. Popular name for the shells of the genus *Cassis*, which includes numerous marine gastropodous molluscs found in the tropical seas. The shells are massive and ventricose, with a narrow aperture. There are about 50 species, many of which attain a large size and are handsomely coloured. From these shells the best shell cameos are cut.



Helmet Shell. Specimen of *Cassis Madagascarensis*

Helmholtz, HERMAN LUDWIG FERDINAND VON (1821-94). German physicist. Born at Potsdam, Aug. 31, 1821, Helmholtz was a descendant of the Quaker William Penn. He made a study of medicine, and during 1843-47 served as a surgeon in the Prussian army. He held the chair of physiology at Königsberg, Bonn, and Heidelberg universities, 1849-71, and then finally became professor of physics at Berlin. His most important post was that of director

of the physico-technical institution of Charlottenburg, to which he was appointed in 1887. At Charlottenburg he died, Sept. 8, 1894.

Helmholtz was responsible for many advances in the study of the eye and the nervous system. The invention of the ophthalmoscope is due to him, one of the most remarkable of all instruments used by the oculist. In 1856-66 was published his work *Physiological Optics*, one of the greatest advances in the theory of vision, etc., of the 19th century. His work on hearing, entitled *Sensations of Tone*, published in 1863, holds a corresponding position in acoustics. The great physicist was one of the founders with Lord Kelvin of the theory of the conservation of energy; to him is due the theory of colour depending on the three fundamental sensations of red, green, and blue or violet; the study of the electromagnetic theory of light; of vortex motion; and the problems of electro-dynamics. Also a philosopher of the empirical school, he must rank with Kelvin as the foremost physicist of his time. Consult Lives, J. G. McKendrick, 1899; L. Königsberger, Eng. trans. 1906.

Helminthology. The study of worms and agricultural parasites. See Worm.

Helmond. Town of the Netherlands. It stands on the Aa, in the province of N. Brabant, 28 m. S.E. of 'sHertogenbosch. The chief building is the castle, finished about 1400. There is also a fine church dedicated to S. Lambert, and a town hall. The town is served by railway, canal, and tramway, and its industries are chiefly connected with the making of cotton and silk goods. There are also engineering plant, soap and tobacco factories, and breweries. It suffered little damage in the Second World War, being liberated from the Germans by the British Sept. 19, 1944. Pop. (1955) 39,336.

Helmont, JEAN BAPTISTE VAN (1577-1644). Flemish alchemist, born at Brussels and educated at Louvain. His outstanding discovery was carbonic acid gas, which he named *gas sylvestre*. This was rediscovered by Black in the 18th century, and called fixed air. Helmont died at Vilvorde, Dec. 30, 1644.

Helmsley. Town and rural dist. of Yorkshire (N.R.), England. The old stone-built town on the river Rye, 20 m. N. of York, is referred to in some ancient

records as Helmsley Blackamoor. Castle ruins, dating from the Norman and E.E. periods, are within the grounds of Duncombe Park; in the 16th century this was the property of the dukes of Buckingham. Near by is Rievaulx Abbey. The town trades in linen and in sheep. There are an old stone cross and a church of the Transitional period, much restored. Pop. (1951) rural district, 4,558.

Helmstedt. Town of Lower Saxony, Germany. It lies 29 m. W.N.W. of Magdeburg. It was once famous for its university, founded in 1576 and suppressed in 1810, and as a spa. The old building of the university is constructed in the Renaissance style, dating from 1592, and has a tower 164 ft. high. The abbey of S. Ludgerus, founded in the 9th century, and now put to secular use, recalls the fact that the first Saxons were baptized here by the saint. The abbey church, originally built in the 11th century, and a chapel of Carolingian origin, show traces of the old construction. S. Stephen's church (13th century) contains fine tombs and carved work. There are several good examples of 16th century domestic architecture. Helmstedt, once a member of the Hanseatic League, has manufactures of agricultural machinery, earthenware, soap, tobacco, etc. Pop. 17,166.

Helm Wind. Name given to a strong cold N.E. wind which occasionally blows down the W. slopes of the Cross Fell range, Cumberland. It is most common in late winter and spring. The features of the wind are the formation of a heavy bank of cloud, known as the helm, along or just above the range, and a stationary roll of whirling cloud, the helm bar, parallel to the former and 1-2 m. from the foot of the Cross Fell. The cold wind blowing down the mountain becomes markedly gusty and ceases abruptly just short of the bar. In dry weather the sky between the helm and the bar is usually clear, although the remainder may be quite cloudy. The name has been applied to similar phenomena observed elsewhere. See Wind.

Heloderm (Gr. *hēlos*, nail; *derma*, skin). Venomous lizard, the only one known to science. There are two species, found in Central America, Mexico, and Arizona. See Gila Monster.

Héloïse (c. 1101-64). French abbess, famous for her early relations with her tutor Abélard (q.v.).

Helots (Gr. *heilōtes*). Lowest section of the community in ancient Sparta. The descendants of a pre-Dorian population, their position was analogous to that of the medieval villein in England and of the Russian serf before his emancipation, though they belonged to the state, and not to any individuals, and could not be removed from the land. The ruling class of Spartans employed them to cultivate their farms, and helots had to hand over a fixed quantity of the produce of the farm each year, being allowed to keep any surplus. Their lot was hard, and they were often treated with great cruelty, though by good service and conduct it was possible for them to obtain freedom.

In war they served as light-armed infantry, and sometimes as oarsmen. The helots, as a class, cherished a most bitter hatred of their Spartan rulers, and in 464 B.C. there was an actual revolt, which was suppressed with great difficulty. A special band of young Spartans, the *Crypteia* or secret police, was charged with the duty of watching the helot population, and any individual who seemed likely to cause trouble was put out of the way.

Helpmann, ROBERT MURRAY (b. 1909). An Australian dancer, choreographer, actor, and producer. Born April 9, 1909, at Mount Gambier, S. Australia, he was educated at Adelaide, and first appeared on the stage there in 1923 as solo dancer. He made



Robert Helpmann, Australian man of the theatre

his London debut at Sadler's Wells in 1931 as Satan in the ballet *Job*, and during 1932-50 was premier danseur there, touring the U.S.A. and Canada in 1949 and 1950. He was responsible for the choreography of *Comus*, *Hamlet*, *The Birds*, *Miracle in the Gorbals*, and other ballets. His first acting part was Oberon at the Old Vic in 1937; he played *Hamlet* there in 1944; *Shylock*, *King John*, and *Hamlet* at Stratford-on-Avon, 1948; *Angelo* in *Measure for Measure*, 1955. Films in which he appeared included *The Red Shoes*, 1948; *Tales of Hoffmann*; *Henry V* (as the Bishop of Ely). He produced *Madame Butterfly*, 1950, and *Cog o' Dr*, 1954 and 1956, at Covent Garden.

Helps, SIR ARTHUR (1813-75). A British essayist and historian. Born at Streatham, July 10, 1813, and educated



Sir Arthur Helps, British essayist After Williams

at Eton and Trinity College, Cambridge, in 1860 he became clerk to the privy council, a post which he held until his death, March 7, 1875. In this capacity he came much into contact with Queen Victoria, and at her request edited Prince Albert's Speeches and Addresses, and Leaves from a Journal of Our Life in the Highlands. He was made K.C.B. in 1872.

Among his original works are *Thoughts in the Cloister and the Crowd*, 1835; *Friends in Council*, 1847-59; *The Spanish Conquest in America*, 1855-61; biographies of Columbus, Cortes, and Pizarro; the tragedies *Catharine Douglas* and *Henry II*, both 1843; and a novel, *Realmah*, 1868. Helps was an earnest writer, whose style won the praise of Ruskin.

Helsingborg or **HÄLSINGBORG**. City and seaport of Sweden, in the lan or govt. of Malmö. It stands at the narrowest part of the Sound, opposite Elsinore (2½ m.) in Denmark, 33 m. N. of Malmö. It has remains of a castle and a fort, mentioned in the 12th century; also mineral springs and sea baths. The artificial harbour is being extended. The exports are timber, iron ore, and cattle; the imports coal, fertilisers, wheat, tobacco, and sugar.

A thriving manufacturing town, Helsingborg has copper and rubber works, sugar refineries, breweries, etc. Long occupied by Denmark, it was often besieged, becoming Swedish in 1710, when Stenbock here defeated the Danes. In the vicinity is the only coal in Sweden. Pop. (1955) 73,342.

Helsingfors. Swedish name of Helsinki (q.v.), capital of Finland.

Helsingör. Danish name for the port better known to the English as Elsinore, under which name it is described here.

Helsinki. Capital of Finland. It stands on the Gulf of Finland, 250 m. by rly. W. of Leningrad, is the seat of the national diet, and has an observatory, botanical garden, and other institutions. The university, founded at Åbo (Turku) in 1640, was moved to the capital in 1827 when Åbo was burned down. The port consists of three harbours and a roadstead with a good anchorage. Considerable export trade is carried on with Russia, Sweden, and England, in timber, paper, cellulose, and butter; the chief industries are sugar-refining, brewing, machinery and carpet making, distilling, and tobacco dressing. The city has many new buildings of individual architecture.



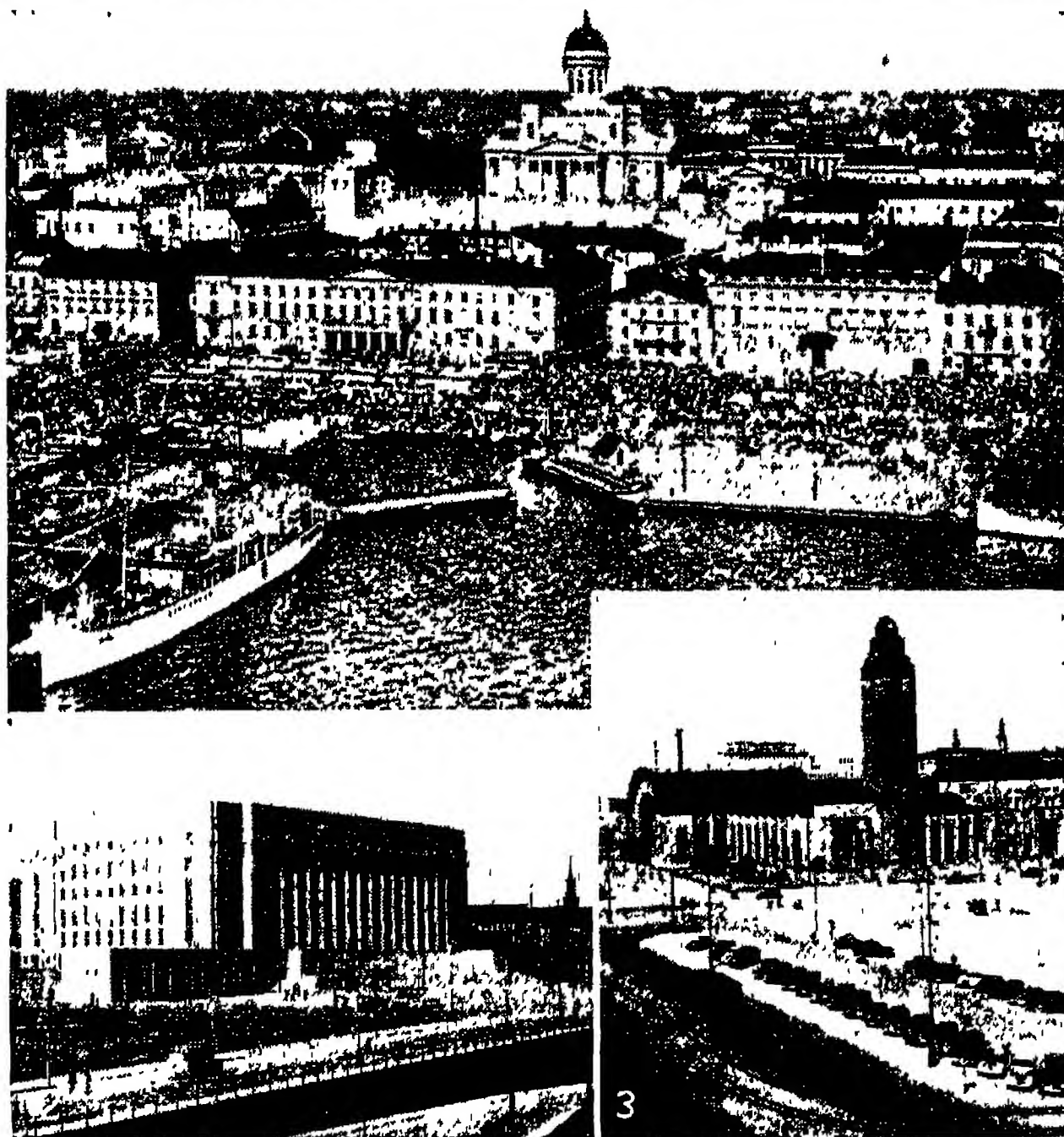
Helsinki arms

Helsinki is protected by the island defences. The coast rly. goes W. to Hangö and Åbo, and a second line runs N. to connect with the line from Vasa round the region of the lakes to Viborg and Leningrad. Founded by Gustavus I about 5 m. to the N.E. in 1550, the town was removed by Queen Christina in 1642; taken by the Russians in 1808, it later became the capital of the grand duchy, and of the republic.

In the Russo-Finnish War of 1939, Helsinki was heavily bombed by Russian aircraft on Nov. 30



Helsinki. Plan of the Finnish capital, showing its principal public buildings



Helsinki, Finland. 1. South harbour, which runs right into the heart of the city; the domed building is the church of S. Nicholas. 2. Diet House, completed in 1931, built of Finnish granite. 3. The railway station, also of granite.

and during Dec. Finland joined Germany in her attack on Russia, June 22, 1941, and Helsinki was bombed repeatedly by the Russians until the armistice, Sept. 19, 1944. Pop. (1955) 403,970.

Helst, BARTHOLOMAEUS VAN DER (c. 1613-70). Dutch painter. Born at Haarlem, he studied probably under Frans Hals, whose style he followed. He lived chiefly at Amsterdam, where he helped to found the painters' guild in 1653, and where he died. There are many portraits of burgesses and soldiers and groups by him in the Rijks Museum, and others at The Hague, Rotterdam, etc. His pictures are solidly painted, but a little lifeless in colour.

Helston. Mun. bor. and market town of Cornwall, England. Standing on the Cober, 12 m. W.S.W. of Falmouth, the terminus of a branch rly., it has since 1934 included Porthleven, a fishing village. Helston is an agricultural centre with a large cattle market on Mon., other markets being held on Wed. and Sat. The 18th century church is dedicated to S. Michael, in whose honour there has been held from time immemorial on May 8 a celebration known as the Furry (or Flora) Dance. King John granted Helston its first

charter in 1201 and during the Middle Ages the burgesses obtained the right to hold markets and fairs. Helston was one of the stannary towns, copper and tin being extensively worked. It retains its mayor and corporation. It is a good centre for visiting the Lizard, and close by is Looe Pool. Pop. (1951) 5,545. See Flora Day.

Helve. Powerful form of hammer at one time extensively used for the "shingling" of iron blooms. This is an operation by which the spongy mass of iron is consolidated and any liquid slag it contains squeezed out. In its usual form the helve consisted of a horizontal beam having at one end a double "knife edge" forming a fulcrum on which it could oscillate, and at the other a massive head, removable for repair or renewal, a fulcrum stand, an anvil, and a cam wheel.

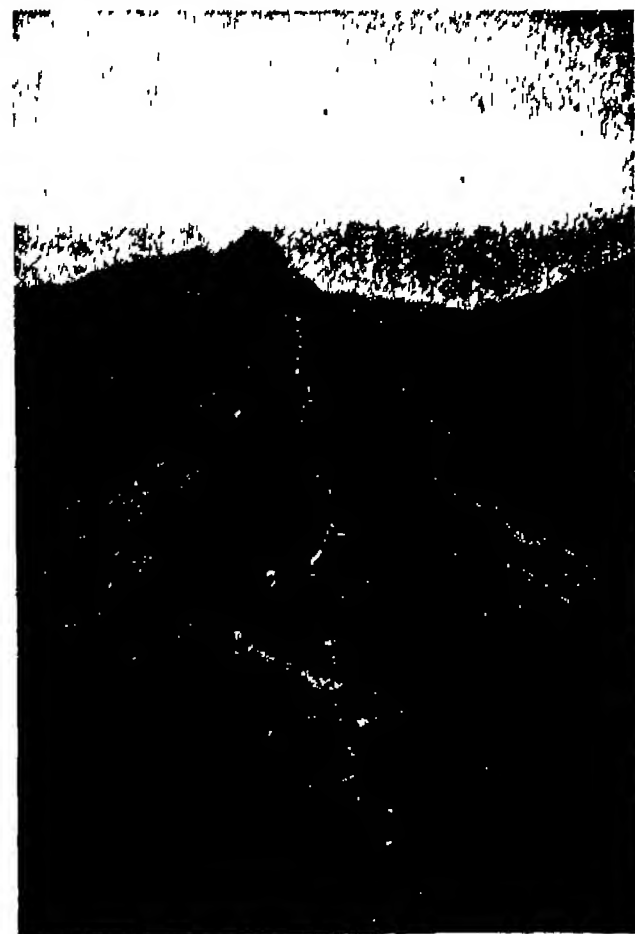
The latter was, in the old days, usually driven by a water wheel, and in revolving lifted the hammer end of the beam a certain distance and then released it so that the hammer fell on the mass of iron on the anvil. The hammer blow would represent sometimes a weight of 10 tons falling 18 ins., the rate of striking being 60 blows a minute. See Steam Hammer.

Helvella. Genus of fungi of the family Ascomycetes. They are all edible, the best known being the white helvella (*H. crispa*) with ribbed, hollow, and inflated stem, and a thin cap broken into lobes which are folded and wrinkled. In the black helvella (*H. lacunosa*) the head is more inflated, less wrinkled, and entirely black.

Helvellyn. Mountain of the Lake District of England. It is on the borders of Cumberland and Westmorland overlooking Ullswater. It is 3,118 ft. high (exceeded in England only by Scafell and Scafell Pike). The best of several ascents is from Patterdale, the way passing along Striding Edge.

Helvetic Republic. Government set up by the French directory in Switzerland. The republic was proclaimed March 29, 1798, as the "Helvetic republic, one and indivisible," a central government, consisting of a senate and great council, for the Swiss cantons being set up at Lucerne. The constitution of the republic was a great step forward in combining the various districts of Switzerland, but quarrels arose and the constitution was abolished by Napoleon, Feb., 1803.

Helvetii. Ancient people inhabiting the western portion of what is now Switzerland. Their chief town was Aventicum (mod. Avenches). The emperor Augustus made a treaty with them, and in the next three centuries they became progressively more Romanised and prosperous until eventually they were overrun by the Alemanni, a confederation of German tribes.



Helvellyn, showing Striding Edge, one of the paths of ascent

Helvétius, CLAUDE ADRIEN (1715-71). A French philosopher. Born in Paris, he was the son of the



Claude A. Helvétius,
French philosopher

queen's physician. As farmer-general of taxes (1738-51), he amassed a large fortune. He spent the rest of his life on his estate near Paris, devoting himself to charitable works and philosophy. He died Dec. 26, 1771. One of the chief representatives of the French Illuminati (q.v.), and intimate with the Encyclopédistes (q.v.), Helvétius was a hedonist and utilitarian. His book *De l'Esprit* (On the Mind), 1758, was banned and publicly burnt. All intelligences, he teaches, are born equal, differences being the result of education. Man is a hedonistic creature, whose only object is to secure pleasure and avoid pain; personal interest is the motive of all his actions. Virtue and vice are relative terms; really virtuous actions are such as promote the general welfare. *Pron.* El-vay-ai-use.

Hely-Hutchinson, JOHN (1724-94). Irish politician. The son of Francis Hely, a landowner in Cork, he was educated at Trinity College, Dublin, and became a barrister. In 1751 he married an heiress, and took the additional name of Hutchinson. In 1759 he entered the Irish house of commons as M.P. for Lanesborough, and retained a seat there as representative of three successive constituencies until his death, Sept. 4, 1794. The gift that had brought him success as an advocate distinguished him in the political arena, and in 1777 he was made a secretary of state. He was also provost of Trinity College. Although rapacious for office and emoluments, Hely-Hutchinson was liberal enough to advocate relief to Roman Catholics, parliamentary reform, and free trade; a policy he preached in his *Commercial Restraints of Ireland*, 1779. His widow was created Baroness Donoughmore, and the present earl of Donoughmore is his descendant.

Hemans, FELICIA DOBOTHIA (1793-1835). English poet. Born at Liverpool, Sept. 25, 1793, she was the daughter of George Browne, a merchant. In 1812 she married Captain Alfred Hemans, but they separated. As a child she had shown precocity, and a

volume of her poems was published when she was 14. Her chief works are *The Siege of Valencia*, 1823, an unacted play; *Lays of Many Lands*, 1825; *The Forest Sanctuary*, 1825; her own favourite *Songs of the Affections*, 1830; *Hymns for Childhood*, 1834. Though without depth, her poems are full of grace and permeated with a love of the chivalrous. A few like *Casabianca*, *The Better Land*, and *The Homes of England*, have stood the test of time. Mrs. Hemans died in Dublin, May 16, 1835. A complete edition of her works with a memoir by her sister was issued in 1839.



Felicia Hemans
After W. E. West

Hemel Hempstead. Mun. bor., parish, and market town of Herts, England. The old town is on the river Gade, 24 m. N.W. of London, and near the Grand Union Canal, with a rly. station on the branch line from Harpenden. Green Line buses connect with London. In the High Street are fine houses and old inns, with Gadebridge Park on the W. The bor. includes Marlowes and Heath Park, and stretches 1½ m. to Boxmoor, Two Waters, and Apsley End. Settlements in the district date from pre-Roman times.

Above Boxmoor, where a Roman villa has been brought to light, is a growing residential area, on the Feldon estate, with golf links. The ancient church of S. Mary, partly rebuilt in 1846 and restored in 1863, has 14th and 15th century roofing and interesting monuments. The old building known as the

Bury once belonged to a monastery at Ashridge. Industries include paper making, apron, blouse, and brush making, iron founding, brewing, and tanning. The growing of watercress for the London market is an important activity. There is a trade in timber. Mentioned in Domesday, Hemel Hempstead gives its name to a county constituency. It was selected as a site under the New Towns Act, 1946, to provide accommodation for a population of 60,000, with complementary industry, under the Greater London plan; building started in 1949. Market day, Thurs. Pop. (1951) 23,523; (1958 est.) 39,520.

Hemichorda. Term used in zoology for a group of animals, the principal genus of which is *Balanoglossus*. The term was used by W. Bates to indicate those particular forms from which vertebrates are supposed to have been derived. They possess certain characters of vertebrates, e.g. gill slits and a modified form of notochord.

Hemimorphite. One mineral of zinc; hydrated zinc silicate ($2\text{ZnO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$), containing, when pure, 51 p.c. zinc. It crystallises in the orthorhombic-hemimorphic system as whitish tabular or prismatic crystals, also massive, granular, fibrous, or encrusting. Hemimorphite occurs in veins or beds in calcareous rocks, generally accompanied by the zinc carbonate, smithsonite, and associated with sulphides of zinc, iron, and lead. Usually a product of the oxidation of primary zinc sulphide (sphalerite) ore, it forms rich deposits in the upper levels of zinc deposits in hot dry climates. Calamine was the name given to this mineral in America. *See* Zinc Ore.



Hemel Hempstead, Herts. Air view of the town and its surroundings, destined for expansion under the New Towns Act, 1946

Heming or **HEMMINGE**, JOHN (c. 1556–1630). English actor. Born at Shottery, he became a member of the lord chamberlain's or king's company, and held shares in the Globe and Blackfriars theatres. He seems to have appeared in King Henry IV, part 1, possibly as Falstaff, and in several plays by Jonson, including Every Man in His Humour, Every Man Out of His Humour, Sejanus, Volpone, and The Alchemist. Shakespeare left him 26s. 8d. for the purchase of a ring. With his fellow-actor Condell, he published in 1623 in a single folio volume the first collected edition of Shakespeare's works. He died at Aldermanbury, Oct. 10, 1630.

Hemingway, ERNEST (b. 1898). American novelist. Born at Oak Park, Ill., July 21, 1898, he was



Ernest Hemingway,
American novelist

educated in Europe and lived in Paris, where he became a member of a group of writers that included Gertrude Stein. He made a reputation as one of the most virile younger novelists. In *The Sun Also Rises*, 1926; *Men Without Women*, 1927; and *A Farewell to Arms*, 1929 (filmed 1933), he expressed the disillusion induced by the First Great War, and his characterisation, terse and deliberately simple, matched his flat, uncompromising style. Later novels included *Death in the Afternoon*, 1932; and, probably his most popular work, *For Whom the Bell Tolls*, 1940 (filmed 1944), dealing with the Spanish Civil War. *For The Old Man and the Sea*, 1952, he was awarded the Pulitzer prize, 1953; and in 1954 he received the Nobel prize for literature. In 1954 also he had remarkable escapes in two aeroplane accidents in central Africa.

Hemiptera (Gr. *hēmi*, half; *ptera*, wings). Name applied to an order of insects otherwise known as Rhynchōta or beaked insects. These include the bugs, plant lice, and water scorpions. They vary greatly in size and form, some being beautiful and others the reverse. The mouth parts are modified to form a rostrum or beak which is used for piercing and sucking; none of them passes through a quiescent pupal stage. As a general rule they have four wings, the fore ones often more or less horny. See Insect.

Hemisphere (Gr. *hēmi*, half; *sphaira*, a globe). Half of the globe. All great circles divide the world into hemispheres, but maps in common use depict hemispheres in only two ways. The equator divides the world into the N. and S. hemispheres. The world is also divided into the E. and W. hemispheres, the latter containing N. and S. America, the former the other continents. The great circle made of the meridians 20° W. and 160° E. is usually taken as the boundary line between the hemispheres. See Earth; Equator.

Hemlock (*Conium maculatum*). Biennial herb of the family Umbelliferae. A native of Europe, N. Africa, N. and W. Asia, it has a stout, furrowed stem, spotted with purple and is 2 ft. to 4 ft. high. The leaves are wedge-shaped, finely divided, fern-like; flowers small, white, in compound umbels. All parts of the plant, but especially the fruits, contain an oily, poisonous fluid, the active principle of which is alkaloid coniine.

Cases of poisoning by conium have occurred from mistaking the leaves for parsley. The symptoms are weakness and paralysis of the muscles, the lower limbs being first affected, and the action of the poison gradually extending upwards. Eventually paralysis of respiration occurs, and death ensues from asphyxia. This sequence of events is described in the well-known account of the death of Socrates, who was condemned to drink hemlock. The treatment is to wash out the stomach, administer stimulants, and perform artificial respiration if necessary.

Hemlock Spruce (*Tsuga canadensis*). Evergreen tree of the family Coniferae. A native of N.E. America, it attains a height



Hemlock Spruce. Leaves and cones
of this N. American evergreen tree

of 60 ft. to 80 ft. The short narrow leaves are green above and white beneath, solitary, in two irregular ranks; the cones small and oval, hanging down from the tips of the branches, with semi-circular scales. It is a timber tree, and the bark is used for tanning.

Hémon, LOUIS (1880–1913.) French novelist. He was born at Brest, Oct. 12, 1880, and died in Canada, July 8, 1913. His great French Canadian novel, *Maria Chapdelaine*, published just before his death, an intimate and moving story of a farming community in the early 19th century, was translated into most languages.

He left two posthumous novels, *Collin-Maillard*, 1924, and *Battling Malone*, 1925.

Hemp. Commercially, a general name for textile fibres produced by a number of unrelated plants, but originally restricted to those obtained from the annual herb hemp. (See *Cannabis*.) African bow-string hemp is

yielded by *Sansevieria guineensis*; Indian bow-string hemp by *Calotropis gigantea*; Bengal, Bombay, Madras, Brown, and Sunn hems by *Crotalaria juncea*; Jubbulpore hemp by *Crotalaria tenuifolia*; Indian hemp by *Apocynum cannabinum*; brown Indian hemp by *Hibiscus cannabinus*. Manila, also known as abaca (*Musa textilis*), sisal (*Agave sisalana*), and phormium (*Phormium tenax*) are referred to as hems, but unjustifiably.

True hemp (*Cannabis sativa*) has been cultivated in nearly all countries of the temperate zones, with Russia and Italy the greatest producers. The best quality is Italian. Although hemp is stronger than jute and endures heat, moisture, and friction with less injury than any other soft fibre except flax, it has been continuously displaced by other fibres. Its use is now mostly for twines. The tow, i.e. the broken and short fibres removed during separation processes, is employed for packings.

Hemp is used as a drug or intoxicant under the names of bhang, ganja, and charas. Hashish is the Arabic name given to a preparation of the leaves. The plant has valuable medicinal properties, and has been widely used in the East.

To discourage branching and produce the maximum length of

fibre, the plants are grown like timber and corn, in close rows. When the ripe stems are pulled they are made into bundles and subjected to processes of retting, bleaching, and scutching, such as are applied to flax (*q.v.*). It is a hardier plant than flax, and needs less attention. Hemp grows best in cool climates, and prefers a moist, rich, well-drained loam. Where both seed and fibre are required, from 2 to 2½ bushels of seed are drilled to the acre, which yields from 20 to 25 bushels of seed and 2 to 3 tons of stems equal to 6 to 8 cwt. of fibre. Male plants are pulled as soon as the flowers wither, but the females are left, of course, until the seeds are ripe. The name, in A.S. *henep*, is connected with Gr. and Lat. *cannabis*. See *Cannabis*; *Rope*.

Hemp Agrimony OR BLACK ELDER (*Eupatorium cannabinum*). Perennial herb of the family



Hemp Agrimony
or Black Elder

Compositae. It is a native of Europe, N. Africa, and N. and W. Asia. It has a branching stem about 4 ft. high, and the leaves are divided into three or five lance-shaped toothed

leaflets. It is one of the simplest of the Composite flowers, each head consisting of five or six pale purple florets, but the heads are gathered into large clusters. The florets are all tubular. A reputedly tonic tea is made of the leaves.

Hemp Nettle (*Galeopsis tetrahit*). Annual herb of the family Labiatae. It is a native of Europe and N. and W. Asia. It has a bristly stem, with swollen joints, and oval-lance-shaped leaves with coarsely toothed edges. The rosy or white flowers are in whorls just above the pairs of leaves. *G. speciosa*, by some regarded as a form of *G. tetrahit*, has larger yellow flowers blotched with purple.

Hemsworth. Urban district and parish of Yorkshire (W.R.), England. It is 8 m. S.E. of Wakefield, 17 m. S.E. of Leeds, 8 m. N.E. of Barnsley, and 12 m. N.W. of Doncaster. Coalmining is the chief industry. The 15th-century church of S. Helen has been extensively restored. The hospital and the free grammar school were both founded by Robert Holgate, an archbishop of York, in the 16th century. Hemsworth gives its name to a county constituency. Pop. (1951) urb. dist., 13,657.

Henbane (*Hyoscyamus niger*). A biennial herb of the family Solanaceae. It is a native of

Europe, N. Africa, and N. and W. Asia. The leaves are oval, lobed or toothed, the upper ones clasping the stem; the flowers are large, funnel-shaped, and dull yellow, veined with purple. The fruit is a many-sided capsule which has a distinct lid.



Henbane, a medicinal herb

The dried leaves are used in medicine. The active principles are poisonous alkaloids called hyoscyamine and hyoscyne. Preparations of hyoscyamus are used with purgatives to diminish griping, and are also given to relieve spasmodic coughing in asthma and spasm of the bladder associated with cystitis or inflammation of the prostate gland. Hyoscyne is used as a sedative in acute mania. In conjunction with morphine it cuts off the pains of labour, producing the condition popularly known as twilight sleep. For this purpose the drug should only be used by skilled hands, and the patient must be continuously under observation. See *Corolla* illus..

Hendaye. Frontier town and small seaport of France, in Basses-Pyrénées dept., on the Bidassoa opposite Irun in Spain. It is the terminus of Route Nationale 10 from Paris. German troops occupied Hendaye on June 27, 1940, and it was recovered by the F.F.I. on Aug. 21, 1944.

Henderson, ALEXANDER (c. 1583–1646). Scottish divine. Born at Criche, Fife, he was educated at St. Andrews, where he became professor of rhetoric and philosophy. He was appointed about Christmas, 1613, to the incumbency of Leuchars, but soon afterwards became



Alex. Henderson,
Scottish divine
From an engraving

a Presbyterian, and strongly opposed the attempt to introduce a liturgy. In 1638 he was moderator to the general assembly, and in 1639 minister of High Kirk,

Edinburgh. In 1641 he was made chaplain to Charles I in Scotland.

Henderson drafted the Solemn League and Covenant of 1643, and attended the Uxbridge conference of 1645. Valuing above all the alliance of Scottish and English Presbyterianism, he strove to prevent Montrose taking up arms on the Royalist side, but avoided a personal quarrel. Conciliatory, diplomatic, scholarly, tireless despite ill-health, Henderson ranks after Knox as the founder of the Reformed Church of Scotland and her greatest non-Catholic churchman. He died at Edinburgh, Aug. 19, 1646. Aiton's *Life and Times*, 1836, is the standard authority.

Henderson, ARTHUR (1863–1935). British politician. Born in Glasgow, Sept. 13, 1863, he was apprenticed as a moulder at Newcastle. Here he came in touch with the trade union movement, and was soon made an official of his society. He was elected as Labour member to the city council, and later to that of Durlington, where he was mayor in 1903. At a by-election in 1903 he was returned as Labour M.P. for Barnard Castle, and was chairman of the parliamentary Labour party, 1908–10 and 1914–17. He represented Barnard Castle until 1918, sitting subsequently for Widnes, 1919–22; Newcastle, 1923; and Burnley, 1924–31.



Arthur Henderson,
British politician

In May, 1915, he joined the Coalition government as president of the board of Education, and in Dec., 1916, became postmaster-general and adviser on labour to Lloyd George. After a visit to Russia, differences arose between him and the prime minister, resulting in Henderson's resignation, in Aug., 1917.

Henderson was Home secretary in the first Labour cabinet, 1924. In the second, 1929, he was made foreign secretary, an office in which he showed outstanding ability and gained international respect. Unable to follow Ramsay MacDonald into the National government in 1931, he became leader of the opposition, but lost his seat at the general election. In 1932 he became president of the disarmament conference at Geneva, his work there earning for him the Nobel peace prize for 1934. He returned to the commons after a

by-election at Clay Cross in 1934, but died Oct. 20, 1935. *Consult* Life, M. A. Hamilton, 1939; From Foundry to Foreign Office, E. A. Jenkins, 1933.

Of Henderson's two sons, William Watson (b. Aug. 8, 1891), became 1st Baron Henderson in 1945. He was a political journalist, edited the Labour Magazine, and sat as M.P. for Enfield, 1923-24 and 1929-31. Arthur (b. Aug. 27, 1893) was Labour M.P. for N. Cardiff, 1923-24 and 1929-31, for Kingswinford 1935-50, and for Rowley Regis and Tipton from 1950. He was joint parliamentary under-secretary for war, 1942-43; financial secretary to the war office, 1943-45; parliamentary under-secretary for India and Burma, 1945-47; minister of state for commonwealth relations, 1947; secretary for air, 1947-51. He became K.C., 1939, and P.C., 1947.

Henderson, GEORGE FRANCIS ROBERT (1854-1903). British soldier and historian. Born at St. Helier, Jersey, June 2, 1854, he was educated at Leeds grammar school and S. John's College, Oxford. He went to Sandhurst, and in 1878 entered the York and Lancaster regiment. In 1882 he served in Egypt, distinguishing himself at Tel-el-Kebir.

In 1889 he joined the teaching staff at Sandhurst, and during 1892-99 was professor of military history at the staff college. He was just beginning the official history of the S. African War when he died in Egypt, March 5, 1903. Regarded as the first military historian of his day, Henderson's great work was *Stonewall Jackson and the American Civil War*, 1898. His lectures and papers were published under the title of *The Science of War* in 1905.

Henderson, SIR NEVILLE MEY-RICK (1882-1942). British diplomatist. Born June 10, 1882, he was educated at Eton, and entered the diplomatic service in 1905. In 1928 he was appointed to the Paris embassy as envoy extraordinary and minister plenipotentiary, and in 1935 was promoted ambassador to Argentina and minister to Paraguay. Transferred to Berlin in 1937, he strove sincerely to bring about an understanding between Great Britain



Sir Neville Henderson, British diplomatist



Hendon Aerodrome. Inaugurated privately in 1910, this metropolitan airfield later became a training station for R.A.F. pilots and was long the scene of their annual displays, during one of which this air picture was taken

and Germany, and when war became inevitable he was bitterly disappointed. It was he who conveyed the British ultimatum to Hitler, Sept. 2, 1939. In 1940 Sir Nevile published some of the inside story in *Failure of a Mission*. He became a group commander in the Home Guard in 1941 and died Dec. 29, 1942. A book of lighter reminiscences, *Water Under the Bridges*, appeared in 1945.

Hendon. Municipal borough of Middlesex, England. It stands on high ground, near the river Brent, 8 m. N.W. of London; it is served by railways and the Northern line, and has bus connexion with the City and West End. The borough includes Edgware, Mill Hill, and Golders Green, and has within its borders the Welsh Harp or Brent Reservoir and Hendon Aerodrome. The district has grown rapidly to achieve in 1951 a pop. of 155,835.

On a summit N. of the old village is the old Perp. church of S. Mary, partly rebuilt in 1827, and notable for its battlemented tower, ancient roof, glass, and monuments, which include an effigy of Sir William Rawlinson (d. 1703). In the churchyard, which commands fine views towards Harrow, Stanmore, and Totteridge, are the graves of Woolner, the sculptor, and Emily, first wife of Coventry Patmore. The manor house was the occasional residence of the abbots of Westminster. Hendon Hall was the home of Garrick, who owned the manor. Hendon derived its name from Heandune or Highdown, and is mentioned as Handone in Domesday. It forms two bor. constituencies. There are almshouses. The newspaper section of the British Museum is here.

Hendon Aerodrome. Airfield adjoining the rly. at Hendon, Middlesex, England. The first airman to fly from Hendon was the French-

man Paulhan, at the start of the historic London-Manchester race of 1910. Claude Grahame-White (q.v.) purchased the field later that year, and established a flying school. To mark the coronation of George V in 1911, Hamel flew the first official air mail from Hendon to Windsor. Later, regular weekly flying meetings were held at what was by then known as London Aerodrome, displays being given by aces such as Hamel and Hucks.

During the First Great War an aircraft factory was established at Hendon, and the Grahame-White school became a training station for pilots of the R.F.C. The aerodrome was eventually purchased by the government as an R.A.F. station. The R.A.F. held an air display here annually, 1920-37, and continued to use it after the Second Great War. Its closing was under discussion in 1957.

Hendren, ELIAS (b. 1889). English cricketer. He was born at Chiswick, Feb. 5, 1889, and played football as wing forward with Brentford. Once a match-card boy at Lord's, he played cricket for Middlesex at 17, and eventually made more runs



"Patsy" Hendren, English cricketer

than all contemporaries except Hobbs and Mead. Hendren had an aggregate of 3,311 in 1928; an innings of 301 not out in 1933; 13 centuries in three separate seasons. Touring the West Indies in 1926, he averaged 126. He thrice visited Australia and played in test matches in England at 45. "Patsy" was a splendid fieldsmen in the deep, and a comedian during play. There was a demonstration at Lord's when in his last

county match, Aug. 30, 1937, he made his 170th century. He became coach at Harrow.

Hengelo. Town of the Netherlands, in the prov. of Overysel. It stands on a small stream, 27 m. E. of Deventer, and is an important rly. junction of several lines. The principal industry is the manufacture of textiles. Pop. (1955) 54,406.

Hengist. A Jutish chief, reputed the leader of the first Anglo-Saxon invaders of England. According to tradition, the British king Vortigern invited the Anglo-Saxons, or some kindred people, to come over and help him against his enemies. Under Hengist and his brother Horsa, they landed in 449 at Ebbsfleet (Kent). They settled in Thanet, becoming little kings; but they soon quarrelled with the British, and in a fight near Aylesford in 455, Horsa was killed. Hengist reigned until 488, leaving a son Oisc.

It has been conjectured that the two names Hengist and Horsa should be applied to one person, *Hengst* being modern German for a stallion.

Hengler's Circus. Amphitheatre, formerly in Argyll Street, Regent Street, London, W. It was built by Frederick Charles Hengler in 1871, and rebuilt, 1884, on the site of Argyll House, a residence of the ducal family of Argyll and later of the 4th earl of Aberdeen. The site of Hengler's Circus, which combined equestrian displays with spectacular performances by children, is now occupied by the Palladium music-hall.

Henie, SONJA (b. 1913). Norwegian-born skater and film actress. Born in Oslo, April 8, 1913, she went to ballet school, but soon revealed an exceptional aptitude for skating. She won the world's championship for figure skating on ten occasions, and was also Olympic champion in 1928, 1932, and 1936. Turning professional, she accepted a Hollywood offer, and was starred in her first film, *One in a Million*, 1937, and many others.

Hénin. Village, town, and hill of France, in the dept. of Pas-de-Calais. The village, Hénin-sur-Cojeul (pop., 1954, 317) lies E. of the Arras-Bapaume road, 5 m. S.E. of Arras. It was captured by the British on April 3, 1917. Here in March, 1918, the British 3rd division made a great stand against the German offensive towards Arras. Hénin was yielded after a stiff resistance, but was recaptured by the 52nd division, Aug. 24. Hénin Hill, near by, taken by the Germans,

March 22, 1918, was the scene of a fine stand. Hénin-Liétard, 16 m. E.S.E. of Béthune, has coalmines. Pop. (1954) 23,673. See Arras, Battles of; Somme, Battles of the.

Henlein, KONRAD (1898-1945). German politician. Educated at a commercial academy, after a period as a bank clerk he became a gymnastics instructor, and during 1923-33 was head of the German sports organization in the Sudeten area of Czecho-Slovakia. With Hitler's accession to power in Germany, Henlein began to agitate for autonomy for the Sudeten Germans. He led a revolt of his followers in 1938, and, when this was suppressed by martial law, changed his demands to reunion of Sudetenland with Germany. After the Munich agreement he was rewarded with the post of Reich Commissioner for the newly acquired territory. On the German invasion of Czecho-Slovakia, March, 1939, he was made *Gauleiter* of Sudetenland, later becoming civil administrator of Bohemia. Captured by the U.S. 7th army on May 9, 1945, Henlein committed suicide next day by taking poison.

Henley, WALTER DE. Medieval writer of the 13th century. His reputation rests entirely on his book on husbandry. Written in French, this was long regarded as the standard book of the kind, a fact attested by the many existing manuscripts and by its translation into English, Welsh, and Latin. There is a modern translation published by the Royal Historical Society. Henley was probably a Dominican monk. See Agriculture.

Henley, WILLIAM ERNEST (1849-1903). British poet and author. Born at Gloucester, on



Sonja Henie giving an exhibition of figure skating



W. E. Henley.
British poet
Elliot & Fry

1873 he went to Edinburgh to be treated by Lister. The limb was saved after 20 months in hospital, during which time he was visited by Stevenson, who became his close friend. A cripple all his life, Henley suffered much pain.

After leaving hospital, Henley settled in London in 1877. He edited successively the weekly paper *London*, the *Magazine of Art*, the *Scots* (afterwards the *National Observer*), and *The New Review*; and was a frequent contributor, chiefly of critical articles, to papers and magazines.

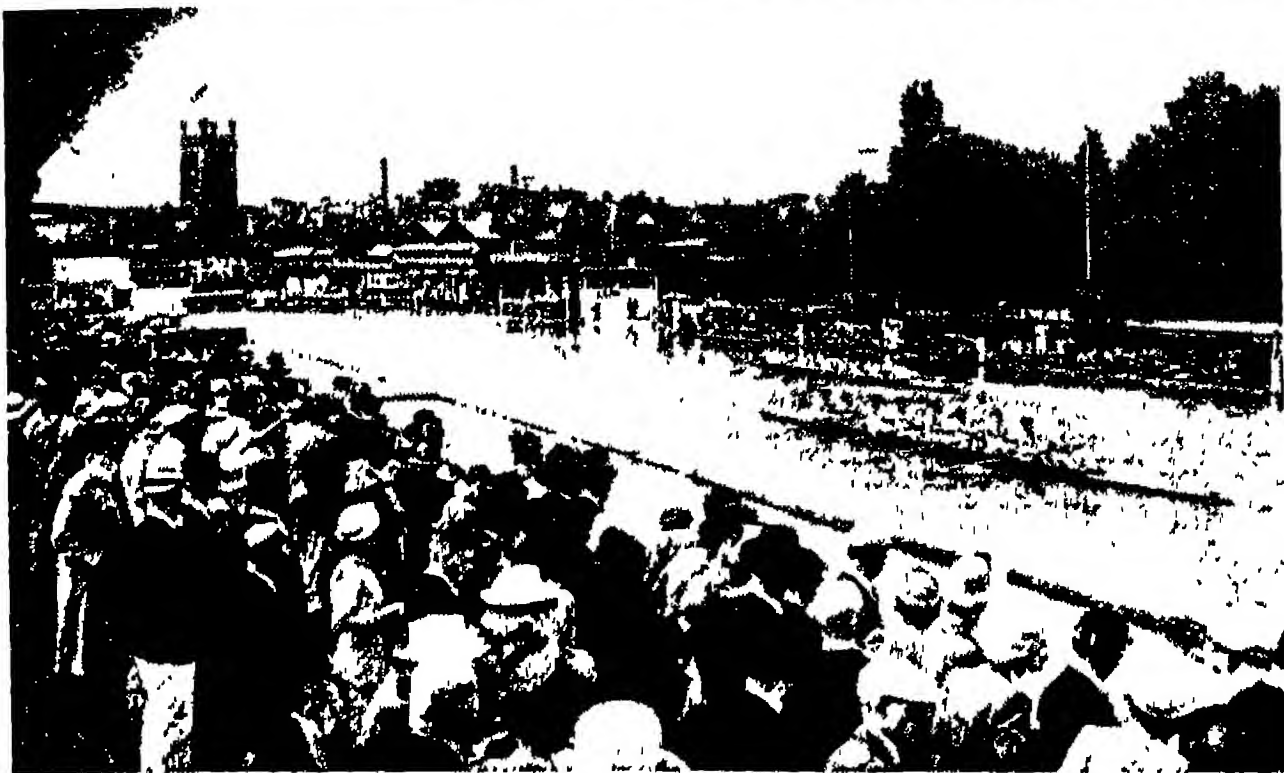
Meantime he obtained recognition as poet with *A Book of Verses*, 1888, which included those he had written on his Edinburgh sick-bed; *The Song of the Sword*, 1892; *For England's Sake*, 1896, a product of patriotic feeling during the S. African War. He edited, with T. F. Henderson, the *Centenary Burns*, 1896-97, to which he contributed a noteworthy appreciation of the poet; also *Lyra Heroica*, 1891, a book of verse for boys. With Stevenson he collaborated in four plays, including *Deacon Brodie*.

Henley was a great talker, a brilliant critic, and an outstanding if at times tempestuous personality. His most famous poem, *Invictus*, justly describes himself. Other well-known verses are those with the refrain, *England, My England*; and the free verse stanzas beginning, *A late bark*. He died at Woking, July 11, 1903. There are studies by L. C. Cornford, 1913; J. H. Buckley, 1947.

Henley-in-Arden. Market town of Warwickshire, England, 8 m. N. of Stratford-upon-Avon. With its picturesque half-timbered houses it has been described as a museum of domestic architecture: the *White Swan* inn dates from 1358, the *Guild House* from 1448. There is a railway station. Market day, Wed. Pop. 1,100. *Council H.-in-A.*: an Ancient Market Town, W. Cooper, 1946.

Henley-on-Thames. Municipal bor. and market town of Oxfordshire, England. It stands on

Aug. 23, 1849, he was educated at the Crypt grammar school of that town, where T. E. Brown was one of his masters. Tuberculous disease threatened him with the loss of a leg in



Henley-on-Thames. View of the town and river in regatta week ; the tower is that of the church of S. Mary

the left bank of the Thames, 36 m. by rly. W. of London. It lies in a beautiful situation beneath the Chilterns. Brewing and malting are carried on, but it is chiefly known as a boating centre. A fine bridge crosses the river here ; built in 1786, it replaced one of great age. The church of S. Mary, with a lofty tower, is an old building ; there is a school dating from the early 17th century ; also a town hall. Here also is a business administration college. The royal regatta is held annually at Henley, which was chosen as venue for the rowing events in the Olympic Games, 1948. A corporate town from 1570, Henley gives its name to a co. constituency. Market day Thurs. Pop. (1951) 7,970.

Henley Royal Regatta. Sporting event, with rowing and sculling races for amateurs. Attended by representatives of all the leading English rowing clubs, and admitting foreign competitors, it was inaugurated in 1839. It takes place annually in July on the Thames at Henley.

The following are the different races and the year of their foundation : Grand Challenge Cup, for eight oars, 1839 ; Stewards' Challenge Cup, for four oars, 1840 ; Diamond Challenge Sculls, for single scullers, 1844 ; Silver Goblets (and Nickalls Challenge Cup), for pair oars, 1845 ; Ladies' Challenge Plate, for eight oars, 1845 ; Visitors' Challenge Cup, for four oars, 1847 ; Wyfold Challenge Cup, for four oars, 1855 ; Thames Challenge Cup, for eight oars, 1868 ; Princess Elizabeth Cup, for school eights, 1946 ; Double Sculls, 1946. The regatta is held under the rules of the Amateur Rowing Association.

Henna. Powdered dried leaves of the Egyptian privet, *Lawsonia*

alba or *inermis*, a plant indigenous to Arabia, but cultivated in N. Africa, India, and Ceylon. It is used for dyeing the hair a reddish-brown colour, or may be employed in conjunction with other dyes (compound hennas). The henna powder, about 5 oz. for a head, is made into a paste with hot water, applied to the hair, and allowed to remain until the dye has acted, careful timing being important. The dyeing properties of henna are due to the presence of lawsone (2-hydroxy-1:4-naphthaquinone).

Henny-Feathered Cock. In a number of breeds of poultry there are relatively inconspicuous differences, either in colour or in shape, between the feathers of the cock and those of the hen. In both they closely resemble the condition usually found in hens. Such breeds are often referred to as henny-feathered. They provide a critical test for theories of the hormonal control of plumage.

Usually in poultry the male hormone has little or no effect on plumage ; the feathers of the male castrate resemble those of the normal male. But the female hormone often has considerable effect, so that the hen differs from the cock or the male castrate. The female castrate usually resembles the male castrate. Two alternative explanations are given of henny-featheredness. There may have been a real, genetically determined, reversal of the reactivity of the feathers, so that in these breeds they react to male hormones as in other breeds they react to female hormones. Or perhaps the plumage is abnormally sensitive to the latter. It is probable that both types of hormone are in fact produced by the gonad of each sex. It should

be emphasised that the castrated henny-feathered cock assumes the normal castrate or male plumage, a fact which has long puzzled poultry-keepers.

Henrietta (1644-70). British princess and duchess of Orleans. Fifth daughter of Charles I and Henrietta Maria, she was born at Exeter, June 16, 1644. Her childhood was passed mostly at the French court, where on March 30, 1661, she married Philip (1640-1701), duke of Orleans and brother of Louis XIV. The duchess, who quarrelled constantly with her husband, became a leader of fashion, but was also chief agent of intercourse with the English court, being devoted to her brother Charles II. In May, 1670, she came to Dover to negotiate the secret treaty between Charles and Louis. Back at Versailles she fell ill and on June 30 died, declaring she had been poisoned. Henrietta is the chief character in M. Irwin's novel, *Royal Flush*, 1932.

Henrietta Maria (1609-69). Queen of Charles I. The youngest daughter of Henry IV of France, she was born in Paris, Nov. 25, 1609. Betrothed to Charles in 1624, she was married by proxy in May, 1625, just after Charles's accession. The queen was fond of gaiety and extravagant, but her partiality for the Roman Catholics governed almost all she did in English politics. She gave countenance and more to her co-religionists, and just before the



Henrietta Maria, Queen of Charles I
After Van Dyck

Civil War her activities did much to fan the flames of discontent. Early in the war she returned from a visit to France with money and stores, and collected a party of royalists, who marched to her husband's aid. In 1644, however, she left England and never saw Charles again, although she was always scheming in his interests and those of their children. During the Commonwealth the queen remained in France, but she returned to England in 1660, living for some time at Somerset House. She died at Colombes, Aug. 31, 1669. There are Lives by I. A. Taylor, 1905 ; Carola Oman, 1936 ; J. Mackay, 1939.

Henry. The practical unit of electro-magnetic inductance. It is named after the American

physicist, Joseph Henry, who discovered electro-magnetic induction simultaneously with, but independently of, Faraday. If the current in a self-inductance of one henry is changing at the rate of 1 ampere per second, a self-induced E.M.F. of 1 volt will be produced between the ends of the coil. Also if the mutual inductance between two coils is one henry, a current changing at the above rate in one coil will induce an E.M.F. of 1 volt between the ends of the other coil. On Jan. 1, 1948, the National Physical Laboratory adopted a new unit known as the absolute henry, to replace the "international henry." The latter is equivalent to 1.00049 absolute henries. See International Units.

Henry. Masculine Christian name. Its meaning, prince of the house, is seen best in its German form, Heinrich. Extensively used in Germany and France, it has always been popular in England, but less so in Scotland. Harry is the true English form. The French form is Henri, the Spanish Enrique. Henrietta, Henriette, and Harriet are feminine derivatives.

Henry I (1068-1135). King of England. Called Beaulerc because he could write, he was born at



Henry I,
King of England

Selby, Yorks, third surviving son of William I, and only son born in England. On the death of William II he promptly secured the throne in the absence of his elder brother Robert of Normandy. He was shrewd enough to realize the advantage of establishing a firm and just government, conciliating his English subjects, and acquiring a thorough mastery over the turbulent Norman baronage. The claims of his brother Robert, a convenient figurehead for the barons, compelled him to fight for his crown, and to make himself master of Robert's duchy of Normandy as well as of England.

In the course of his reign of thirty-five years (1100-1135) he won for himself the name of the lion of justice, laying the foundations of the work which was carried out by his grandson, Henry II; especially by his organization of the Curia Regis as the royal court of law administered by trained lawyers, and of the itinerant justices whose courts periodically supervised the administration of justice

in the provinces. In 1103 he became involved in a dispute with Anselm on the investiture question. Henry's only son, William, was drowned in the White Ship. He left his throne to his daughter, Matilda or Maud, widow of the emperor Henry V, and wife of Geoffrey of Anjou; but on his death, Dec. 1, 1135, the crown was successfully claimed by his nephew Stephen. See Investiture.

Henry II (1133-89). King of England, the first of the Plantagenets. He was born at Le Mans,



Henry II,
King of England

March 5, 1133, the son of Geoffrey, count of Anjou, who was the second husband of the Empress Matilda or Maud, daughter of Henry I of England. Maud was dispossessed of the English throne by her cousin Stephen of Boulogne, whose nineteen years' reign was a nightmare of civil war and feudal anarchy. Young Henry succeeded his father as count of Anjou, received his mother's duchy of Normandy which Stephen had not seized, and married Eleanor, duchess of Aquitaine, in 1152, thereby becoming, in effect, lord of the western half of France. In 1154 he succeeded Stephen on the English throne in place of his mother, who still survived.

Though now only twenty-one he had proved himself to be extraordinarily prompt, energetic, self-willed, and capable. In France, though a feudatory, his power at least rivalled that of the king, and his ambitions were European rather than English. But he realized that his kingdom should provide the real basis of power; and though he spent more than half his reign in France, he devoted himself to the establishment in England of a powerful monarchy.

Without delay, he cleared the country of the mercenaries and adventurers who had swarmed into it under Stephen, pulled down some thousands of the castles which the barons had built, and stamped out all resistance by the rapidity of his movements. The country was weary of anarchy, and the great majority of the barons were now in favour of restoring law and order. In the struggle with his archbishop, Thomas Becket (q.v.), he strove with only partial success to subject the clergy to the ordinary law, and to assert the royal supremacy over the clerical organi-

zation. By seutage, the partial substitution of money payments for military services, and by a revival of the old English fyrd or militia, he strengthened the military ascendancy of the crown over the baronage. He reorganized the administration of justice and finance on lines suggested by Henry I.

He sanctioned the intervention in Ireland of his barons, and then compelled both them and the native chiefs to recognize him as overlord, Ireland being thus annexed to the English crown. His later years were vexed by the turbulent disobedience of his sons, and he died at Chinon, July 6, 1189, in the course of a struggle with his son and successor, Richard, who had joined in arms with the French king. Henry, Geoffrey, and John were other sons. See Avanches; consult Lives, Mrs. J. R. Green, 1888; L. F. Salzman, 1914.

Henry III (1207-72). King of England. Born at Winchester, Oct. 1, 1207, he succeeded his father,



Henry III,
King of England

King John, in 1216, while the struggle with the barons was still in progress. The general recognition of the young king was, however, soon procured by the veteran, William Marshal, earl of Pembroke. During the years of his minority the country was well governed, first by Pembroke and then by Hubert de Burgh.

In 1227 Henry's personal reign began. Unfortunately he was one of the most incompetent of English kings. With more cultivated tastes than most of his contemporaries, personally brave and virtuous, and a devoted son of the Church, he lacked any conception of his duties as a king. First he fell wholly under the influence of his mother's Poitevin connections, who filled all the offices of state. The pressure of the irritated barons removed the Poitevin, but on Henry's marriage with Eleanor of Provence, in 1236, a new flood of foreigners usurped all positions of importance, and under their influence the provisions of Magna Carta extorted by the barons from his father were persistently ignored. Matters came to a head when Henry, in obedience to the pope, accepted the crown of Sicily for his son Edmund, and endeavoured to procure from the country the money necessary to secure it.

The Great Council of barons, now headed by Simon de Montfort, assembled in arms at Oxford in 1258, and compelled the king to accept the Provisions of Oxford, which instituted an elaborate machinery of baronial committees to organize the government of the realm. The barons themselves were so little of one mind that Henry, supported by the arbitration of Louis IX of France, was enabled to repudiate the Provisions, and Montfort's party prepared to resist. The section of the barons whose chief aim was to secure their own independence supported the king. Montfort defeated the royalists at the battle of Lewes, May 14, 1264, and virtually assumed the functions of a dictator.

But Montfort's dictatorship was resented; the royalists rose in arms and Montfort was killed at the battle of Evesham, Aug. 4, 1265. The king was now dominated by the personality of his extremely able son, who was presently to succeed him as Edward I, and to him Henry now resigned the real control of the state. Order was restored and Edward himself began to enforce the very principles for which Montfort had died. Henry died at Westminster Nov. 16, 1272.

Henry IV (1367-1413). King of England. Henry of Bolingbroke, successively earl of Hereford, earl of Derby, duke of Lancaster, and Henry IV, was born at Bolingbroke, near Spilsby, Lincolnshire, April 3, 1367. He was the son of John of Gaunt, duke of Lancaster, grandson of Edward III, and cousin of Richard II.

During Richard's reign he was one of the lords appellant who opposed the king's early policy. In 1398 he was sent into exile. On his father's death he returned to England in 1399, nominally to claim his estates, actually to depose Richard and set himself on the throne, his title being derived from parliament, which acknowledged him as the lawful heir, disregarding the superior claims of his infant cousin, Edmund Mortimer.

With him began the rule of the house of Lancaster, in circumstances which compelled the Lancastrian kings to yield unprecedented submission to the will of parliament. Henry's need for the alliance of the Church produced

the first enactment for the burning of heretics and the suppression of Lollardy. A revolt in Wales, headed by Owen Glendower, was followed by a still more serious revolt of the Percys, which was ended by the battle of Shrewsbury, July 21, 1403. In 1405 there was another insurrection prompted by the exiled Percy of Northumberland and headed by Mowbray and Archbishop Scrope, and another in 1408. After this, Henry was much troubled by the antagonism of his council, headed by the prince of Wales, afterwards Henry V. He died March 20, 1413. Other sons were John (Bedford); Thomas (Clarence); Humphrey (Gloucester).

Henry V (1387-1422). King of England. Henry of Monmouth, born Aug. 9, 1387, succeeded his



Henry V

father, Henry IV, in 1413. The legends concerning "Madcap Hal" are hardly to be trusted. It is quite certain that, as prince of Wales, Henry acquired very serious training as a soldier in the campaign against the Percys and in Wales, and that he played an active part at the council table during his father's last years. Certainly he exhibited on his accession a character and a high sense of responsibility not generally anticipated. Something of a religious zealot, as king he persecuted heresy sternly, persuading himself that his secular ambitions were justified because he was an instrument in the hands of the Almighty for the regeneration of a corrupt and demoralised France.

At the beginning of his reign his power of swift decision and rapid action were displayed in the prompt and crushing suppression of a Lollard insurrection at its outset. He then at once turned his mind to the popular project of reviving the quite untenable claim of the English kings to the French crown, France at the time being distracted by the rival factions of Burgundians and Armagnacs. In 1415 an expedition set sail for Normandy, laid siege to Harfleur, and captured it. Leaving a garrison there, Henry, with a small available force of efficient, not more than 8,000 men, made an ostentatious march through Normandy to Calais. This at last brought down upon him the hosts

of the French, who had temporarily adjusted their differences, and over them his little army won the victory of Agincourt, Oct. 25, 1415.

The next two years he devoted to serious preparations for an organized conquest. In 1417 he again landed in Normandy and set about its systematic reduction, taking city after city and establishing a regular government as he advanced. In Jan., 1419, Rouen fell. The assassination of John of Burgundy drove his son Philip into the arms of the English. The Burgundian faction held possession of the person of the crazy king Charles VI, and on May 21, 1420, the treaty of Troyes was signed which recognized Henry as heir to Charles and regent during his life, while it gave him the hand of the princess Catherine in marriage. The greater part of France, however, repudiated the treaty. It was still necessary to continue the process of systematic conquest, and before even the whole of the N. had been brought into subjection, Henry died of dysentery at Vincennes, Aug. 31, 1422. See Agincourt; consult Henry V, A. J. Church, 1889; Henry V, C. L. Kingsford, 1901; The Reign of Henry V, J. H. Wylie, 1914-19.

Henry VI (1421-71). King of England. Henry of Windsor, born Dec. 6, 1421, son of Henry V, succeeded to the English throne Aug. 31, 1422. During his childhood the government was in the hands of a council, while his uncle, the duke of Bedford, acted as regent in France. Before Bedford's



Henry VI

death, in 1435, it had become virtually certain that the French conquests of Henry V would not be retained. Joan of Arc (*q.v.*) had revived the French national spirit, and the tide of English victories was turned.

The second definitely marked section of the reign extends from 1435 to 1453. It witnessed the gradual expulsion of the English not only from northern France, conquered by Henry V, but even from Guienne, which had never been entirely separated from the English crown for 300 years. Only the Calais Pale was left. After Bedford's death the party of the Beauforts and Poles was dominant, the Beauforts being legitimated descendants of John of Gaunt, who

hoped to secure the succession for themselves, as they ultimately did in the person of Henry VII. The opposition to them was headed by the king's uncle, Humphrey, duke of Gloucester, and, after his death in 1447, by Richard of York, the grandson of Edmund Mortimer. In 1445 Henry married Margaret of Anjou, who allied herself with the Beauforts.

After Gloucester's death, Richard was the nearest prince of the blood and the heir presumptive to the throne until the birth of a prince of Wales in 1453. The basis of the strife between the Yorkist and Beaufort factions was the fact that the king was very nearly an imbecile and occasionally quite insane, so that York claimed the right to exercise the authority of the heir.

From 1453 onwards (the third phase of the reign) the rivalry became increasingly acute—York acting as Protector of the Realm when the king was quite mad, the queen's party regaining the ascendancy when he recovered. The coming War of the Roses was foreshadowed in the battle of St. Albans, May 22, 1455, which was followed by a temporary reconciliation; but in 1459 open war broke out. York, after a victory at Northampton where Henry was taken prisoner, July 10, 1460, claimed the crown for himself in virtue of his descent from the elder brother of John of Gaunt; but he accepted a compromise, by which the crown was left to Henry during his life, but York, instead of the prince of Wales, was recognized as his heir.

York was killed at Wakefield, Dec. 30, 1460. His son Edward seized the crown with the aid of the earl of Warwick, and crushed the Lancastrians at Towton, March 29, 1461, from which year dates the reign of Edward IV. Meanwhile Henry had escaped from his captors and found refuge in Scotland. In 1465 he was caught again and imprisoned in the Tower. In 1470 Warwick revolted against Edward, drove him out of the country, and again set Henry on the throne. But in 1471 Edward returned, finally crushed the Lancastrians at Barnet, April 14, and Tewkesbury, May 4, where the prince of Wales was killed, and secured his throne when Henry was secretly put to death, May 21.

Henry was the gentlest and most pious of men, and most earnest in the spread of education. To him England owes many educational foundations, notably Eton and King's College, Cambridge. *Consult* Religious Life of Henry VI, F. A. Gasquet, 1923.

Henry VII (1457-1509). King of England. Henry Tudor, earl of at Pembroke



Henry VII,
King of England

Richmond, born Castle, Jan. 28, 1457, claimed the throne as representing the House of Lancaster through the Beauforts, legitimated descendants of John of Gaunt, father of Henry IV. He overthrew and slew Richard III at the battle of Bosworth, Aug. 22, 1485, was formally recognized by parliament as the legitimate king, and secured the position of his posterity by marrying Elizabeth of York, the eldest daughter of Edward IV, whose brothers had been murdered by the last king.

The young earl of Warwick, the male representative of the Yorkist line, was shut up in the Tower. Lambert Simnel, a pretender who personated Warwick, was made the figurehead of a Yorkist revolt which was easily crushed. A more dangerous pretender was Perkin Warbeck, who claimed to be the younger of the two princes murdered in the Tower by Richard III. He was finally captured in 1497, and both he and Warwick were executed in 1499.

Henry's great task was the re-establishment in England of a strong government in the control of the crown. To this end the first necessity was to destroy the power of the remnant of the nobles left by the War of the Roses. This Henry effected by heavy fines and confiscations which filled the royal treasury and helped him, after 1499, to dispense with parliaments which until then he had summoned frequently. The laws forbidding the nobles to maintain retainers were strictly enforced.

Henry avoided foreign wars, relying upon diplomatic action and alliance with the rising power of Spain as a check upon France. Partly in order to raise the middle class as a counterpoise to the nobles Henry directed his policy to the expansion of commerce, though he used its restriction as a weapon against adversaries on the Continent. He also patronized explorers and artists. He died at Richmond, April 21, 1509. *Consult* Lives, J. Gairdner, 1889; C. Williams, 1937.

Henry VIII (1491-1547). King of England. This second son of Henry VII, born at Greenwich, June 28, 1491, succeeded his father April 21, 1509, his brother Arthur having died in 1502. Having ob-

tained a papal dispensation, he married his brother's widow, Catherine of Aragon. His reign falls into two definite periods, the first, that of Wolsey's ascendancy, ending in 1520. The second is marked by the complete establishment of the royal supremacy, in which Henry's principal agent was Thomas Cromwell.

The young king was inveigled into a war with France by Ferdinand of Spain and the emperor Maximilian, but the war came to nothing. In the course of it a Scottish invasion was crushed at the great battle of Flodden, Sept. 9, 1513. Henry found in Wolsey a minister to whom he could safely entrust the control of state affairs; though the king's own will was always supreme. The cardinal sought to make England the arbiter between the two powerful young European monarchs, Francis I and Charles V; but it was probably against Wolsey's will that England in 1522 sided with Charles



Henry VIII
After Holbein

in his war with Francis, playing therein no very effective part.

Wolsey's fall was brought about by Henry's determination to marry Anne Boleyn, and for that purpose to procure the nullification of his marriage with Catherine of Aragon. In 1520 Wolsey failed to procure the papal sanction for the divorce, and was in consequence dismissed, with rank ingratitude for his faithful service. His policy of holding the balance between Charles and Francis fell into abeyance; Henry subordinated all else to coercing the pope.

Supported by the parliament, which he summoned with that end in view, and probably guided by Cromwell in the methods he adopted, Henry compelled the clergy to acknowledge him as supreme head

of the Church in England; ended once for all the payments made to the papal treasury; and finally repudiated the ecclesiastical authority of the pope in England. In defiance of the pope, the English ecclesiastical courts pronounced the marriage with Catherine void.

The next step was the suppression of the monasteries; the smaller houses were dissolved on the score of immorality in 1536, and the larger in 1539, partly on the same charge and partly on that of treason. Henry, however, permitted no departure from the recognized doctrines of the Church beyond distinguishing between practices which were essential and those enforced as "convenient." A Catholic insurrection in the north called the Pilgrimage of Grace, in 1536, was mercilessly and treacherously suppressed. The royal authority was secured by the Treasons Act, 1534, and the Royal Proclamations Act in 1539. Henry was always careful to obtain every increase of royal power, and sanction for all legislation, from parliament itself.

With the same cynical ingratitude which had flung Wolsey aside, he sent Cromwell to his doom in 1540. The last years of the reign were marked by a desultory war with France; the crushing of an invading Scots army at Solway Moss in 1542; and attention to the navy.

Henry married six times. The marriage with Catherine of Aragon was annulled; Anne Boleyn was executed on charges of treasonable infidelity; Jane Seymour died giving birth to the future Edward VI; the marriage to Anne of Cleves was pronounced void within weeks of its celebration; Catherine Howard suffered the same fate, on the same charge, as Anne Boleyn; but Catherine Parr survived her husband, who died Jan. 28, 1547. Henry was a more than ordinary scholar and musician.

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Henry I, CALLED THE FOWLER (c. 876-936). German king. Son of a duke of Saxony, Henry succeeded him in 912, and both before and after his accession did much to protect his land from

various invaders. His fame as a warrior spread far, and in 919, after Conrad's death, he was chosen German king. His reign was full of wars, for many princes refused to submit to him, and he quarrelled with the king of France over Lorraine; but to Saxony he was a great benefactor, not unlike Alfred in England. He trained and organized an army to defend the country, had walls built around the towns, and in other ways made the duchy more secure and prosperous, also enlarging his territory by wars with his neighbours. Henry died July 2, 936, and was succeeded by his son, Otto the Great.

Henry II (973-1024). German king and Roman emperor. Born May 6, 973, a descendant of Henry the Fowler, and son of the duke of Bavaria, in 995 he succeeded to the dukedom, and in 1002, when Otto III died without sons, induced the German notables to choose him as their ruler. He had some trouble with other claimants, but he managed to hold his own, and spent the next few years in Italy, in warfare with the Poles and in crushing a series of rebellions. In 1014, there being then a lull in this strife, Henry was crowned emperor at Rome, and the concluding years of his reign were passed in an attempt to add Burgundy, then a separate kingdom, to his lands, and in fighting the Greeks in Italy, where he was the pope's ally. He died July 13, 1024. Henry, who was known as the Saint, was keenly interested in ecclesiastical matters, being one of those who wished to see the Church reformed. He was canonised in 1140.

Henry III (1017-1056). German king and Roman emperor. Son of the emperor Conrad II, he was born Oct. 28, 1017. To secure his future position Conrad had him crowned king when he was only ten years old, and in a few years he began to take an active part in imperial affairs. He succeeded to the throne in 1039, no rivals appearing to dispute his inheritance, and his reign of seventeen years was almost free from that internal strife which disturbed the time of his father and his son. On the frontiers, however, Henry had full occupation. The Bohemians and the Hungarians were most troublesome; so on the other side were Burgundy and Lorraine. These risings, however, were all crushed, and having settled a dispute between three rivals for the papacy by appointing Clement II, Henry was crowned

emperor at Rome in 1046. The Normans next felt the weight of his hand. The emperor, whose first wife was a daughter of Canute the Great, died Oct. 5, 1056.

Henry IV (1050-1106). German king and Roman emperor. Born Nov. 11, 1050, he was the son of the emperor Henry III, who had him chosen and crowned king of the Romans before he was four. This secured the Empire for him when his father died in 1056, but for the next twelve years he was controlled by ambitious ecclesiastics, and did not really begin to reign until 1069.

Henry is chiefly known as the rival of Gregory VII. He refused to give up, at the papal command, the right to invest the German bishops with their lands, and was excommunicated. Alone he would probably have been able to resist the pope, but the alliance of the latter with the powerful forces of discontent in Germany, especially strong in Saxony, was too much for him, and in 1077 he submitted to Gregory at Canossa. The reconciliation did not endure; excommunication by the pope was answered by declarations of deposition by Henry, and rivals were put forward to both parties. He was for a time hard pressed, but gradually he wore down his foes.

In 1081 Henry went to Italy, gained successes in the north, and, after several rebuffs before its walls, entered Rome in 1084. Gregory was dethroned and besieged, and his successor Clement III crowned Henry emperor. The last period of Henry's life was troubled by risings on the part of his sons. The elder, Conrad, found support in Italy, but not in Germany, where Henry, the younger, had many friends. The malcontents made the old emperor prisoner, and forced him to abdicate, but he managed to escape from their hands and was preparing for a new campaign when he died at Liège, Aug. 7, 1106. See Empire; Gregory VII.

Henry V (1081-1125). German king and Roman emperor. The son of the emperor Henry IV, he was born Jan. 8, 1081. When his elder brother Conrad revolted, the elder Henry named him as his successor, and, the princes consenting, he was crowned as such in 1099. However, he revolted against his father, who died Aug. 7, 1106. Henry then became sole king, and in 1111 he was crowned emperor in Rome. A previous ceremony for this purpose broke up in violent disorder, and this

one was preceded by disorder in Rome between the forces of the emperor and those of the pope.

This reign is marked by a settlement of the investiture controversy, though only after the bitter struggle had been continued from the time of Henry IV. The emperor attacked the lands of the pope and his friends, and set up anti-popes of his own; in return he was excommunicated and his enemies encouraged. The concordat of Worms signed in 1122 was a compromise. When not in Italy, Henry was fighting against rebellious vassals. He died at Utrecht, May 23, 1125. He married Matilda, daughter of Henry I of England, but left no children. See Investiture.

Henry VI (1165-97). German king and Roman emperor. Son of the emperor Frederick I, he was educated by clerics for the high position marked out for him by his father. When only four years old the emperor had him chosen and crowned as his successor, and when nineteen he acted as ruler of Germany. The main interest of his life arose from his marriage in 1186 to Constance, the heiress of the kingdom of Sicily, an event which led to serious trouble between pope and emperor.

In 1190, on Frederick's death, Henry began his short reign. At once he went to Italy, where the death of the king of Sicily had just given him another crown. He was crowned emperor in Rome, but he found the rebels in his southern kingdom, which included Naples, too strong for him. In Germany, too, his foes were strong and numerous, but after a year or two of fighting he brought about something like peace. In 1194 he went to Sicily; this time his armies were stronger than those of his rival Tancred, whose death took place at this time, and he was crowned king at Palermo.

This achieved, and Germany more peaceful, Henry sought to extend his power in other directions, his one aim being to make himself overlord of the kings of Europe. He had just put down a fresh rising in Italy when he died at Messina, Sept. 28, 1197. Henry was a man of some culture.

Henry VII (c. 1270-1313). German king and Roman emperor. A son of Henry III, count of Luxembourg, this prince was a Frenchman

in speech and sympathy, but, doubtless because he was none too powerful, was chosen German king in 1308. He did what he could to restore order in Germany, and in 1311 went to Italy, where Dante and the Ghibellines hoped he would restore the authority of the empire. But although crowned emperor in 1312, Henry was quite unequal to this achievement in the face of his strong and numerous enemies. He died at Buonconvento, near Siena, Aug. 24, 1313. His son was John, the blind king of Bohemia, who fell at Crecy. On Oct. 30, 1920, his remains were removed from the Campo Santo at Pisa to the cathedral, where a monument had been erected.

Henry I (1008-60). King of France. A son of King Robert and a grandson of Hugh Capet, he was crowned king in his father's lifetime. In 1031 his father died, and he reigned alone until 1059, when he made his own son Philip his colleague, dying Aug. 4 in the following year. His reign was spent in warfare, first with his brother Robert, and then with his vassals, prominent among whom was William of Normandy, the Conqueror of England. He also had relations, not always friendly, with the pope and the emperor Henry III.

Henry II (1519-59). King of France. Son of Francis I, he passed part of his early life in Spain, where from 1526-30 he was a hostage. In 1533 he married Catherine de' Medici, and in 1536 became heir to the throne on the death of his elder brother Francis. For the next ten years he occupied himself mainly in dissipations, was dominated by his mistress, Diana of Poitiers, and quarrelled with his father, one difference being due to the dauphin's Spanish sympathies. In 1547 he became king, and his rule of eleven years was a period of oppression at home and war abroad. His favorites managed everything in their own interests, for the manly frame of the king was not matched by a manly spirit.

During a tournament held to celebrate a double wedding in the royal family, Henry was wounded

in the head by the lance of the count of Montgomery on June 30, and he died July 10, 1559. Three of his sons Francis II, Charles IX, and Henry III, came to the throne; the other was Francis, duke of Anjou. One of his daughters was the wife of Philip II of Spain, and another of Henry of Navarre.

Henry III (1551-89). King of France. Third son of Henry II and Catherine de' Medici, Henry was born at Fontainebleau, Sept. 19, 1551. In 1573 he was elected, against his own will, king of Poland. Soon the death of his elder brother, Charles IX, in 1574, brought him back to France as king. Although a man of considerable ability, the real ruler of his kingdom was his mother. He found a dangerous enemy in Henry, duke of Guise, and all but lost his crown on the Day of Barrières, May 12, 1588, when the Guise party engineered a rising in Paris, and then sought in vain to placate popular discontent by summoning the states-general at Blois. There, Dec. 23, 1588, he treacherously caused Guise to be assassinated. Excommunicated, he tried to retrieve his power by an alliance with the Huguenots and Henry of Navarre, whom he recognized as his heir, but he was mortally stabbed in Henry's camp at St. Cloud by Jacques Clément, Aug. 1, 1589.

Henry IV (1553-1610). King of France. Born at Pau, Dec. 14, 1553, he was a son of Antony of Bourbon and his wife, Jeanne d'Albret, queen of Navarre. He was brought up as a Protestant, and spent part of his youth at the French court, where he was educated, for the Bourbons were a younger branch of the royal family. The union was made closer by Henry's marriage in 1572 with Margaret, sister of Charles IX; six days later the massacre of St. Bartholomew occurred. In the same year he became king of Navarre. His life had been spared by his promise of conformity to Roman Catholicism, but in 1576 he joined the Huguenot leaders.

The absence of children to the French king and his brothers made Henry an important person in France, and for the next 13 years he was concerned in its various intrigues. He began his career as a soldier by leading the Huguenots in the short war that ended in 1580, and in 1586-87 he carried



Henry V,
German king



Henry I,
King of France



Henry II,
King of France



Henry III,
King of France

on another. The Guises were determined to prevent his accession, but events compelled Henry



Henry IV,
King of France
After Porbus

III to recognize the king of Navarre, who became titular king of France on the former's assassination, Aug. 1, 1589.

Henry had now to conquer his kingdom, which he did by a wise mixture of diplomacy and force. He won the battles of Ivry and Arques and successfully besieged Rouen in 1592, but he was foiled before Paris, and more potent than arms was his politic conversion in 1593 to Roman Catholicism—Paris, he said, was worth a Mass. In 1598 Philip II of Spain, who had helped his enemies, made the peace of Vervins, and France, granted the edict of Nantes, which gave complete toleration to Huguenots, was more than ready to accept Henry as king.

Henry's reign was a period of comparative prosperity. Under a great finance minister, Sully, much was done for industry; the burdens on the people were reduced and the evils of the civil war to some extent remedied. Abroad the house of Hapsburg was watched jealously, its ambitions being checked by steady encouragement to its enemies. War had just been declared upon the emperor when, on May 14, 1610, the king was assassinated by Ravallac. Henry owed his popularity to the circumstances of his reign, the relief it brought from civil strife, and to his own qualities, his courage and gaiety, frankness and amiability. His passion for women was notorious; he had many mistresses and several illegitimate children. But immorality and pleasure did not interfere with regal duty or domestic policy. His lawful issue included Louis XIII, Gaston, duke of Orleans, and Henrietta Maria, the queen of Charles I.

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Henry, Sir Edward Richard (1850-1931). British police organizer. He entered the Indian civil service in 1873 as an assistant magistrate-collector and in 1891 became inspector-general of police in Bengal. In 1901 he was

appointed an assistant commissioner of the London metropolitan police, and was commissioner 1903-18. He had studied the Indian custom of impressing thumb prints on legal documents; and at Scotland Yard he used this knowledge, together with Dalton's scientific treatise on finger prints, as a basis of the filing system which now enables the police to identify one finger print from thousands in a few minutes. Henry was knighted 1906, made a baronet 1918, and died Feb. 19, 1931. See Criminology.

Henry, George (1858-1943). Scottish painter. Born in Ayrshire, he studied at the Glasgow school of art. In 1890 a picture of *The Druids*, executed in collaboration with E. A. Hornel, called attention to both painters, and in the same year Henry's *Galloway Landscape*, at the Glasgow Institute, marked a new departure.

In 1893 he accompanied Hornel to Japan; but the visit, so far from enhancing his liking for brilliant colour patterns, was followed by a leaning towards more restrained tones. Rich colouring and tone distinguish *The Blue Gown*, now in the Cape Town gallery; *The Mirror*, *Gold-fish*, and *The Blue Veil* are representative of his nameless portraits. He was elected A.R.S.A. 1892, R.S.A. 1902, and R.A. 1920. He died Dec. 23, 1943.

Henry, Joseph (1799-1878). American physicist. Born at Albany, N.Y., Dec. 17, 1799, he became professor of mathematics and natural philosophy at Albany academy in 1826. There he at once showed a remarkable ability in electrical research



Joseph Henry,
American physicist

and experiment, improving the electro-magnet so that his experiments marked a definite epoch in the practical applications of the electric current. In 1831-32 Henry carried out experiments in the transmission of electric current which foreshadowed the invention of the telegraph. His discovery in 1842 that the discharge of a Leyden jar induced discharges in other circuits some distance away was fundamental to the theory of wireless telegraphy. In 1846 Henry was appointed secretary to the Smithsonian Institution. Died May 13, 1878. The henry, electric unit of inductance, bears his name.

Henry, Matthew (1662-1714). British nonconformist divine. He was born at Broad Oak, Flintshire, Oct. 18, 1662, and studied for the law. In 1687, having been ordained, he became a Presbyterian minister at Chester, where he was extraordinarily influential. He remained there until 1712,



Matthew Henry,
Nonconformist
minister
From a print

when he became minister of a church in Mare St., Hackney. He died at Nantwich, June 22, 1714, and there is a monument to him at Chester. Henry is specially noted for his *Exposition of the Old and New Testament*, frequently republished, which was completed by several nonconformist divines.

Henry, O. Pen-name of William Sydney Porter (1862-1910), American short-story writer and journalist. Born at Greensboro, North Carolina, Sept. 11, 1862, the son of a doctor, he was educated at a private school there, and acted for a time as prescription clerk in a drug-store. In 1882 he moved to Texas, where, in his own words, he "ran wild." He also wandered in Central America and was for a time in New Orleans. Eventually, in 1894, he became editor and part owner of a humorous weekly journal, *The Rolling Stone*, in Austin, Texas, where he also worked as a bank clerk. The venture failed. In 1895 he joined the staff of a Houston newspaper, but in 1896 was sentenced to five years' imprisonment following a charge of embezzlement. While in the penitentiary he wrote (1898) the first of that sequence of brilliant short stories which brought him fame when he moved to New York early in the 20th century. Settling there he quickly established himself as a highly popular writer, his work appearing in all the leading magazines. He died in New York, June 5, 1910.



O. Henry,
American author

Thirteen volumes of his short stories were published, of which the first, *Cabbages and Kings*, appeared 1905, and the last, *Waifs and Strays*, posthumously. The other volumes were *The Four*

Million, The Voice of the City, The Heart of the West, The Gentle Gaffer, Roads of Destiny, Options, Sixes and Sevens, Rolling Stones, Whirligigs, The Trimmed Lamp, and Strictly Business. A number of his stories were laid in S.W. and Central America, others in New Orleans; but the two titles named first in the foregoing list give the clue to O. Henry's richest source of material, the life of the common people of New York, which he called Baghdad-on-the-Subway. His alert sympathy no less than his quick humour gives him kinship with Dickens; while as a master-craftsman of the short story he ranks with Maupassant and Kipling. His style, apparently casual and well decorated with idiom, is unique; and none has equalled the skill with which he contrives the unexpected *dénouement*. Many of his best stories, e.g. *The Gift of the Magi*, have found their way into anthologies.

In Great Britain O. Henry remained an almost unknown name until some years after his death, when the issue of his books in cheap editions during the First Great War created something of a vogue. *Consult* O. Henry, C. A. Smith, 1916; *Alias O. Henry*, G. Langford, 1957.

Henry, PATRICK (1736-99). An American orator and statesman. Born at Studley, Va., May 29,



1736, he was of Scottish-Welsh descent. Unsuccessful as farmer and tradesman, he took up law, and rapidly built up a practice. In the Virginia house of

burgesses he violently attacked the Stamp Act of 1765 and favoured an immediate rupture with Britain. A delegate to the Continental Congress of 1774, at the Virginia Convention of 1775 by an eloquent speech he induced the members to pass resolutions for arming the state. It was here that Henry exclaimed, "Give me liberty or give me death." While governor of Virginia, in 1788, at the convention assembled to ratify the federal constitution, he opposed its introduction as calculated to infringe the rights of individual states. He died June 6, 1799. *Consult* *Life, Correspondence, and Speeches*, W. W. Henry (grandson), 1891.

Henry of HUNTINGDON. English chronicler. A cleric in the diocese of Lincoln, Henry lived in the early 12th century and wrote a History of the English from the coming of Julius Caesar to the reign of Henry II.

Henry THE LION (1129-1195). German prince. The son of Henry the Proud, duke of Bavaria and Saxony, he belonged to the Guelph family. In 1139 he became duke of Saxony and Bavaria, but his friends had to fight for his rights, which were threatened by Conrad III. In 1142 peace was made; Henry gave up Bavaria and kept Saxony. His name was to be made as a soldier of ambition and gallantry.

He extended the Saxon boundaries by driving back or conquering the heathen tribes beyond the Elbe. He recovered Bavaria, being granted the duchy by the emperor Frederick I, who was anxious for his assistance in his Italian wars. This Henry gave until 1175. In 1181 the emperor invaded Saxony, and the duke soon submitted. Of his great possessions he was allowed to keep Brunswick and Lüneburg only, while he was banished until 1185. He died Aug. 6, 1195. Henry, who married Matilda, daughter of Henry II of England, was ancestor of the electors of Hanover and kings of Great Britain. *See* Frederick I; Saxony.

Henry THE MINSTREL (BLIND HARRY) (d. c. 1492). Scottish poet and reciter. Said to have been a native of Lothian, and blind from his birth, he made a living by reciting a poem of his own composition, into which he wove all the traditional stories about William Wallace. There are several entries in the royal treasurer's accounts of payments to him, 1490-92. His poem, written in the Lothian dialect, and consisting of more than 5,000 couplets, exists in a MS., dated 1488, preserved in the National Library of Scotland. A modernised version, by William Hamilton of Gilbertfield, 1722, was long popular in Scotland.

Henry THE NAVIGATOR (1394-1460). Portuguese prince. The son of King John I, he was born at Oporto, March 4, 1394. His mother was a daughter of John of Gaunt. He took part in the conquest of Ceuta, 1415. He began to send out sailors on voyages of discovery, and with intervals continued to do so for 45 years. He himself went on one or two voyages, but he was mainly occupied with organizing and financing the expeditions.

These opened up the W. coast of Africa, found the Cape Verde Islands, and rediscovered the Azores. Henry made his home at Sagres, where he erected an observatory, set on foot something like a college of navigation, and had an arsenal. He died Nov. 13, 1460. *Consult* Henry the Navigator, E. Sanceau, 1946.

Henry VII's Chapel. Eastern extension of Westminster Abbey (q.v.). Founded by the king after whom it is named, it replaced the 13th century Lady Chapel in 1503-19. Henry VII intended it to be the shrine of Henry VI, who is buried at Windsor; it became his own burial place. At the E. end, in the apse, are five small chapels; the nave or central chapel is divided from the S. aisle or Margaret Chapel, and the N. aisle or Elizabeth Chapel, by the stalls of the knights and esquires of the order of the Bath (q.v.). In length 104 ft., breadth 70 ft., unrivalled in its sculpture, the fan tracery of its roof, its stone statues of saints, beautiful specimens of later medieval art, stone panelling and traceried windows, it is the finest example of late Perp. architecture in the U.K. The name of its architect is unknown. The chapel was "restored" by Wyatt, 1807-22.

On the large oaken and bronze-covered doors, the grille surrounding Henry VII's tomb, and in the E. window are badges or emblems symbolical of Henry's claim to the throne. In the vault beneath the tomb, the work of Pietro Torrigiano, rest Henry VII, his wife Elizabeth of York, and James I. Below the altar Edward VI was buried. W. of the altar were interred George II and Caroline of Anspach. In the N.E. chapel of the apse is the grave of Anne of Denmark; in the S.E. chapel that of Dean Stanley. In the S. or Margaret Chapel, lie Mary Queen of Scots, Charles II, many other members of the Stuart line, Mary II, William III, Queen Anne and her husband, Prince George of Denmark. Features of the N. aisle or Elizabeth Chapel are the tomb of Queen Elizabeth, whose coffin rests on that of her half-sister, Mary; and the grave of Addison.

In 1940 the window in the easternmost of the five little chapels forming the *chevet* of Henry VII's Chapel was destroyed by a German bomb. It was replaced by Hugh Easton's stained glass unveiled on July 10, 1947, in memory of air crews who lost their lives in the battle of Britain,



Henry VII's Chapel. Tomb of Henry VII and his queen in the famous Tudor Gothic chapel in Westminster Abbey. Round the walls hang the banners of the Knights of the Bath, with which it has been associated since 1725

July 10-Oct. 31, 1940. Resting on a lectern is the roll of honour. See Fan-Tracery illus.

Henry Esmond, THE HISTORY OF. Novel by Thackeray, usually referred to for the sake of brevity as *Esmond* (q.v.).

Henry Frederick (1594-1612). Eldest son of James I of England. He was born at Stirling, Feb. 19, 1594. In 1604 negotiations were begun for his betrothal to the infant Anne of Spain, but they fell through. Sent to Oxford in 1612, the prince seems to have loved sport better than study.

Created prince of Wales in 1610, he died of fever Nov. 6, 1612, to the grief of the country.

Henryson, Robert (c. 1430-c. 1500). Scottish poet. He was a schoolmaster at Dunfermline, and perhaps also a notary. Among his poems are *Robene and Makyne*, the first pastoral in the Scottish language, the *Testament of Cresseid*, a sequel to Chaucer's *Troilus* and *Crisseyde*, a metrical version of Aesop's Fables, and *The Bludy Oak*, an allegory.

Henschel, Sir George Isidore (1850-1934). German-born British musician. He was born in Breslau,

Feb. 18, 1850, and studied music at Leipzig. In 1877 he came to England, where he appeared as a baritone. During 1881-84 he conducted symphony concerts at Boston, U.S.A. Returning to England, he devoted himself to singing, teaching, and conducting, and founded the London Symphony concerts, which he conducted 1884-95. In 1881 he married Lilian June Bailey (1860-1901), an American soprano. He became a British subject in 1890, and was knighted in 1914, dying Sept. 10, 1934. His compositions include the opera *Nubia*, songs, church music and chamber music. He wrote *Musings and Memories of a Musician*, 1918.

Henslowe, Philip (d. 1616). English theatre proprietor. Born in Sussex, he settled in Southwark. He specialised in theatres and less reputable places of amusement. With Edward Alleyn (q.v.), who married his stepdaughter, he built the Fortune Theatre at Cripplegate, and had financial dealings as impresario and money-lender with many Elizabethan dramatists. His diary is preserved in the college library at Dulwich.

Henson, Herbert Hensley (1863-1947). British prelate. Born in London, Nov. 8, 1863, he was a non-collegiate student at Oxford and was elected fellow of All Souls in 1884. He was ordained and became head of Oxford House, Bethnal Green, where he worked until



H. Hensley Henson. British prelate

made vicar of Barking, 1888-95. Incumbent of S. Mary's hospital, Ilford, in 1900 he was chosen canon residentiary of Westminster and rector of S. Margaret's. There he remained until 1912. As dean of Durham he took an active interest in the university. In 1918 he was consecrated bishop of Hereford, and in 1920 was translated to Durham, retiring 1939. In 1940-41 he was a canon of Westminster. He died Sept. 27, 1947.

Henson was a leading exponent of broad church ideas, including a close cooperation with non-conformists. He advocated reform of the Prayer Book, and when this was opposed by parliament he declared for disestablishment of the Church. An incisive style made him a formidable controversialist in such books as *Anglicanism*, 1921; *In Defence of the English Church*, 1923; *Christian Morality*, 1936. Consult his *Retrospect of an Unimportant Life*, 3 vols., 1942, '43 '50; *Letters*, 1950.

Henson, Leslie Lincoln (b. 1891). British comedian. Born Aug. 3, 1891, he went to Emanuel School. Having worked with concert parties, he appeared on the London stage in pantomime in 1910. His adroit patter, combined with perfect timing and an unusual range



Leslie Henson. British comedian

of comic facial expressions, established him as a leading comedian in musical comedy, e.g. *To-Night's the Night*, 1915, *Kissing Time*, *The Cabaret Girl*, *Funny Face*, 1928. During 1930-34 he was co-lessee with Firth Shephard of the Strand Theatre, where he appeared in *It's a Boy* and *It's a Girl*. A series of musical comedies at the Gaiety, 1935-38, followed, including *Seeing Stars* and *Going Greek*. Henson produced and played in

Up and Doing, 1940; Fine and Dandy, 1942; 1066 and All That, 1947; Bob's Your Uncle, 1948; Harvey, 1950; The Diary of a Nobody, 1955.

Henty, GEORGE ALFRED (1832-1902). British war correspondent and writer for boys. Born at Trumpington, near Cambridge, Dec. 8, 1832, he was educated at Westminster and Caius College, Cambridge. He served in the purveyor's department of the British army in the Crimean War. In 1866



George A. Henty,
British writer,
Elliott & Fry

he became correspondent for the Standard, and saw much fighting. These experiences he turned to good account in his long series of books for boys, which he began to write in 1868. Among the best are The Young Frano-Tireurs, The Cat of Bubastes, The Young Carthaginian, The Lion of S. Mark, With Clive in India, By Pike and Dyke. Henty died at Weymouth, Nov. 16, 1902.

Henzada. District, subdivision, and town of Burma, in the Irawadi division. Of the district area, about one quarter is under cultivation, and nearly the whole of the cultivated ground is devoted to rice. The exports consist largely of rice, while the imports include cotton and silk piece goods and chinaware. Henzada town, on the Irawadi, 65 m. W.N.W. of Pegu, is an important trade centre, connected by rly. with Bassein. Area of dist., 2,870 sq. m. Pop., dist., 693,271; town, 23,651.

Heparin. Active anticoagulant substance prepared from liver. It delays blood clotting without damaging the plasma or cells, and is used in blood transfusion and after an operation if there is danger of thrombosis.

Hepatica (*Anemone hepatica*). Perennial herb of the family Ranunculaceae, native of Europe. The thick dark green leaves are divided into three oval lobes; the flowers are blue, each on a long stalk direct from the rootstock, the showy parts being the sepals.

Hepatitis. Medical term for inflammation of the liver. Infective hepatitis (catarrhal jaundice) is a virus infection which sometimes occurs in epidemics, more usually sporadically. The incubation period is 3-5 weeks and the onset is marked by general malaise, anorexia, abdominal discomfort,

and a slightly raised temperature. After a few days, except in mild cases, jaundice appears. The illness lasts about 3 weeks and convalescence is sometimes slow. Depression is a marked feature.

In amoebic dysentery there is frequently an associated hepatitis and an amoebic abscess of the liver may develop.

Hepburn, SIR JOHN (c. 1598-1636). Scottish soldier of fortune, a native of East Lothian. He probably attended St. Andrews University. In the Thirty Years' War in Germany he fought under Mansfield, then under Gustavus Adolphus of Sweden became colonel of a regiment from which the Royal Scots directly descend. Hepburn was at the siege of Frankfort-on-Oder, helped to win the battle of Leipzig, 1631, and took Donauwörth. After Gustavus's death he entered the French service, being killed at the siege of Saverne (Zabern), July 8, 1636.

Hephaestus (Gr. Hephæstos). In Greek mythology, god of fire and the working of metals. He was the son of Zeus and Hera, but was so disliked by his mother that she threw him out of Olympus. On another occasion Hephæstus, having offended Zeus, was again thrown out, falling for a whole day and landing in the island of Lemnos. He is represented as having been lame from birth or lamed by his fall.

Some accounts make him the husband of Charis, one of the Graces; others the husband of Aphrodite. The famous armour of Achilles and Aeneas, and the fire-breathing bulls of Aetëas which guarded the golden fleece, were the work of Hephæstus. His chief workshop was in Lemnos, but various volcanic islands, such as Sicily, were also supposed to be the scene of his activities. At Athens he was associated with Athena and Prometheus, with whom he has many points of resemblance, and festivals with torch-races were held in their honour. Hephæstus was identified by the Romans with Vulcan. See Aeschylus; Vulcan.

Hepplewhite, GEORGE (d. 1786). English furniture maker. After serving his apprenticeship with Gillow, a cabinet-maker at Lancaster, he started a business in London which his widow carried on after his death as A. Hepplewhite & Co. Drawings supplied by this firm were published in The Cabinet-maker and Upholsterer's Guide in 1788.

Hepplewhite's name is identified with the style in furniture which

followed the Chippendale period, and was a cautious revolt against the solidity of the latter. Its characteristic was the curvilinear, all the pieces having sweeping lines, with a leaning to the classic style of the Directoire modified by English sturdiness. In the tracery of cabinets and bookcases straight rather than curving lines were used. The cabinets were placed on tall legs, usually square, though also round, and tapered. The chairs had shield, oval, circular, hoop, and interlaced heart, fretwork backs. See Chair; Furniture.

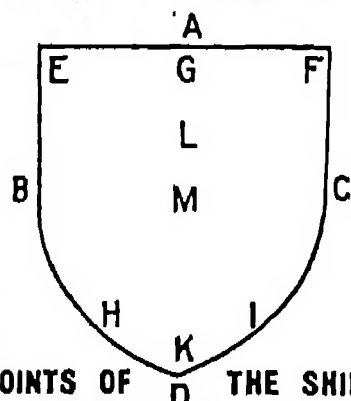
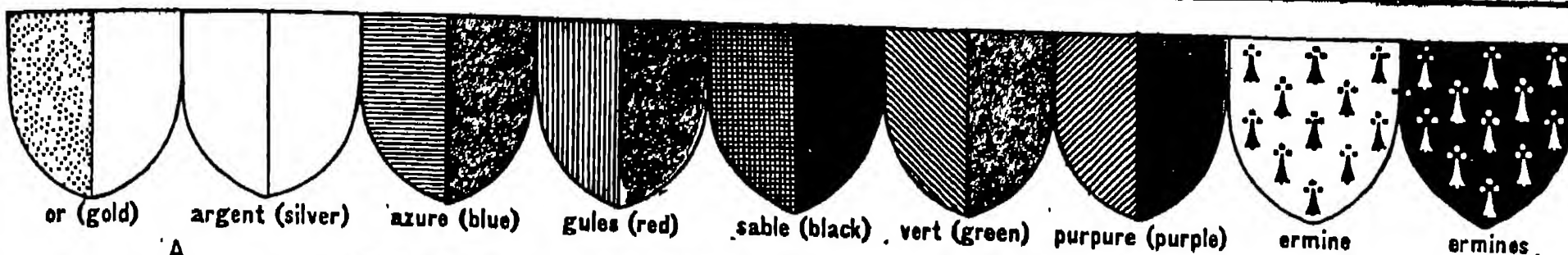
Heptameron, THE (Gr. *hepta*, seven; *hēmera*, day). Stories written, in imitation of Boccaccio's Decameron, by Margaret (1492-1549), queen of Navarre (sister of Francis I. and grandmother, not wife, of Henry IV). The book tells of a company of lords and ladies who, returning from the baths at Cauterets, were detained in a beautiful spot for seven days by the flooding of a stream in the Pyrenees, and devoted the time to telling extremely sprightly stories.

Heptarchy. Word derived from the Greek *hepta*, seven, and denoting the seven kingdoms (*archai*) into which Anglo-Saxon England was supposed to have been divided before 900. The seven presumably were Kent, Essex, Sussex, Wessex, Mercia, East Anglia, and Northumbria. See England; History.

Hepworth (JOCELYN) BARBARA (b. 1903). British sculptor. Born Jan. 10, 1903, at Wakefield, she studied art at Leeds, and at the Royal College of Art. Closely related in kind to the sculpture of Henry Moore (*q.v.*), but narrower in range, her carving revealed an intense precision and mastery of form. She tended to use ovoid shapes as a basis, and many of her designs resembled musical instruments. A member of Unit One, she became a leading exponent of the abstract, exhibiting at London galleries. See Art illus. p. 665.

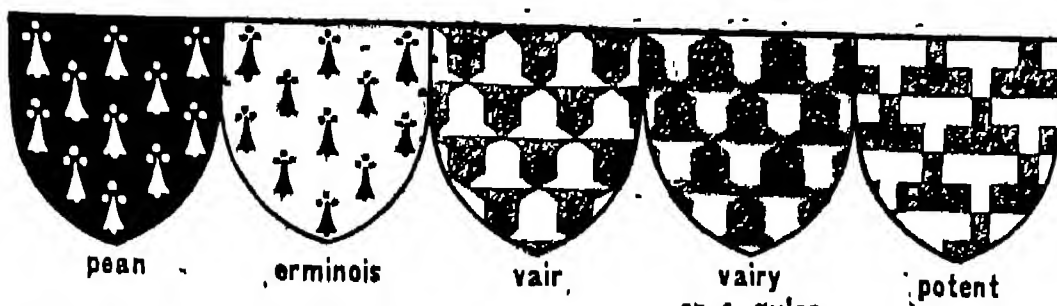
Hera. In Greek mythology, sister and wife of Zeus and daughter of Cronos and Rheia. One of the major deities of ancient Greece, by Zeus she became the mother of Arës, Hephæstus, and Hëbë. She is generally represented as of a jealous disposition, and she displayed the utmost vindictiveness towards those with whom her husband had amours. Among those persecuted by her were Nemelë and her child Bacchus or Dionysus, and Hercules.

Hera had frequent quarrels with her husband, and on one occasion plotted with Athena and Poseidon

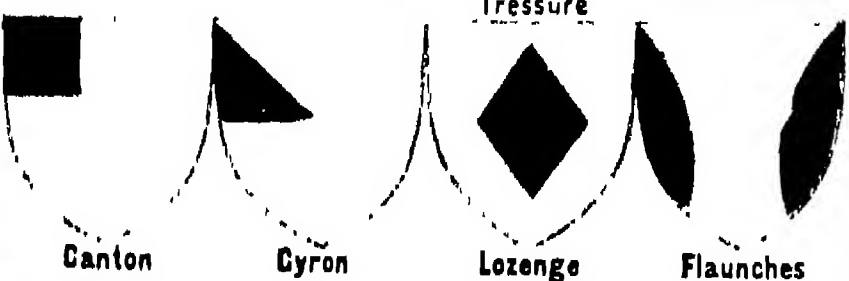
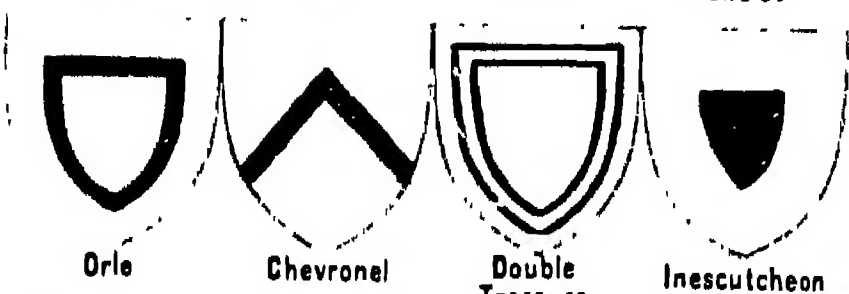
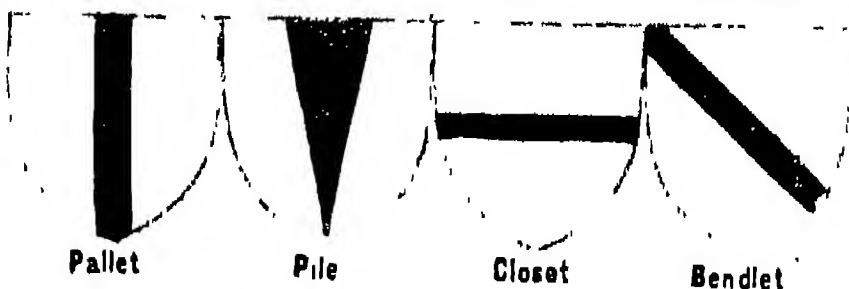
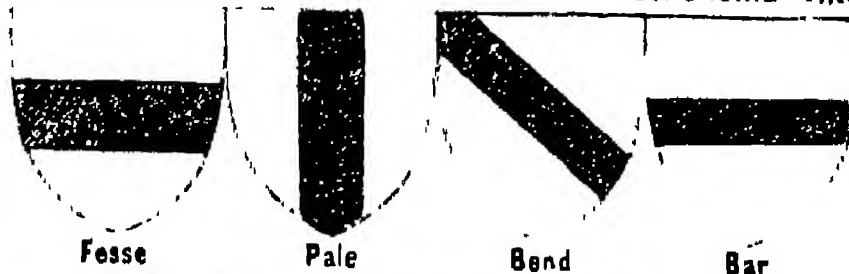


POINTS OF THE SHIELD

- A. The chief
- B. Dexter side
- C. Sinister side
- D. The base
- E. Dexter chief
- F. Sinister chief
- G. Middle chief
- H. Dexter base
- I. Sinister base
- K. Middle base
- L. Honour point
- M. Fesse point



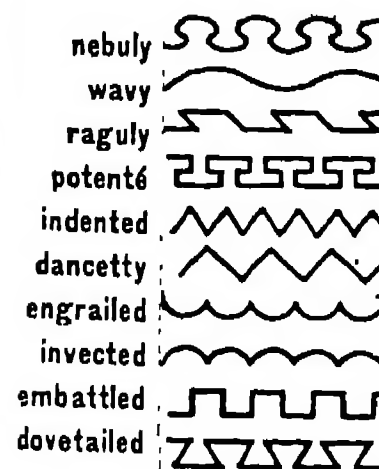
METALS, COLOURS, AND FURS, WITH THEIR CORRESPONDING TINCTURES



HONOURABLE ORDINARIES AND SUBORDINARIES



MODERN HERALDIC HELMETS

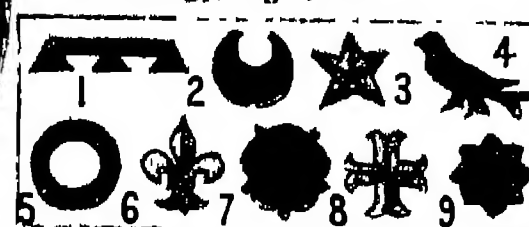


LINES OF PARTITION



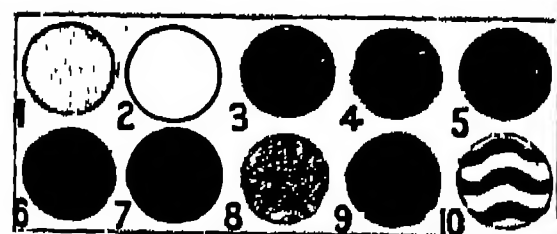
MULTIPLICATION AND COMBINATION OF ORDINARIES

- A. Barry of six pieces az. & or
- B. Paly of six pieces arg. & gules
- C. Bendy of eight pieces or & az.
- D. Barry-bendy, gules & arg.
- E. Chevronnée, vert. & or
- F. Paly-bendy, arg. & gules
- G. Checky, or & sable
- H. Lozeny, arg. & az.

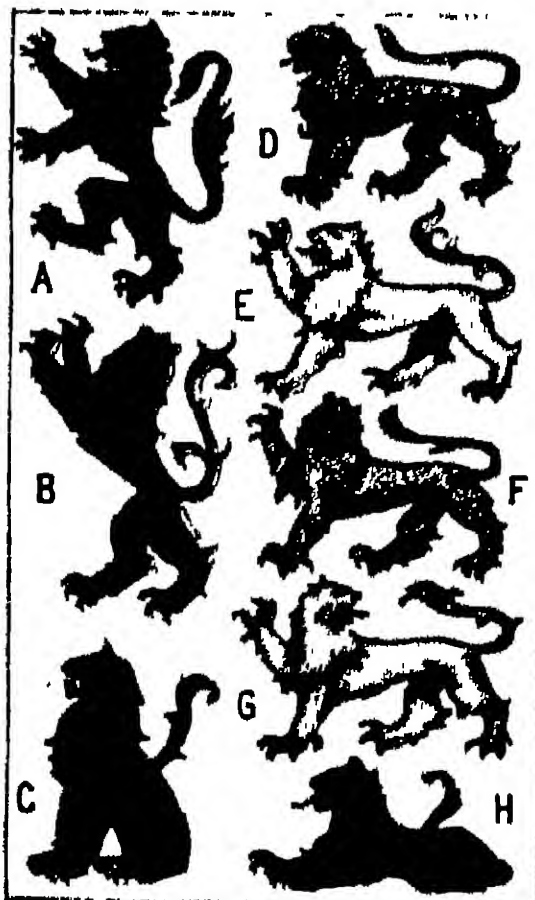


ENGLISH MARKS OF CADENCY

- 1. Label borne by eldest son during his father's lifetime
- 2. Crescent by the second son
- 3. Mullet by the third son
- 4. Martlet by the fourth son
- 5. Annulet by the fifth son
- 6. Fleur-de-lis by the sixth son
- 7. Rose by the seventh son
- 8. Cross Moline by the eighth son
- 9. Double Quatrefoil by the ninth son



- Roundels. 1. Bezan. 2. Plate. 3. Hurts. 4. Torteau. 5. Pomme. 6. Colp. 7. Pellet. 8. Oranga. 9. Guze. 10. Fountain.



LION CHARGES ON SHIELDS

- A. Rampant
- B. Salient Guardant
- C. Sejant
- D. Statant
- E. Passant
- F. Passant Guardant
- G. Passant regardant
- H. Couchant



BARNARDISTON
Azure, a fess dancetté, ermine, between six cross crosslets argent



FENWYKE
Per fess, gules & arg., six martlets counterchanged



BLOUNT
Barry rebulé of six pieces, or and sable



WITTEWRONG
Bendy of six, arg. and gules, on a chief, azure, a bar indented, or



POPE
Per pale, or & az., on chevron between 3 griffins' heads erased, 4 fleurs-de-lis all counterchanged



OLDFIELD
Or, on a pile, vert, three garbs of the field



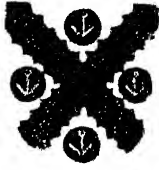
LAWSON (of Isell)
Per pale, arg. and sa., a chevron counterchanged



GELL
Per bend, az. and or, three mullets of six points in bande, pierced and counterchanged



WILLIAMS (of Llangibby)
Gyronny of eight, ermine and sable, a lion rampant, or



FLETCHER
Arg., a saltire, engr. ru., between 4 roundels of 2nd, each charged with a pheon of the field



GUISE
Gules, seven lozenges, vair, three, three, and one



WILLOUGHBY
Or, two bars, gules, each charged with three water-bougets, arg.



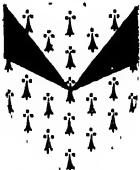
SPENCER
Quarterly, az. & gu.; in 2nd & 3rd quarter a fret, or; over all, a bande sa., charged with 3 escallops, arg.



ACTON
Quarterly, per fess indented, argent & gules; in first quarter a Cornish chough, sable



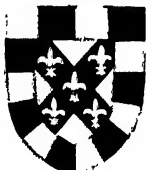
DORMER
Az., ten billets, or, 4, 3, 2 & 1; on a chief of second, a demi-lion issuant, sa.



HOLLES
Erms., two piles, issuant from ramp., or; on a chief, arg., a mullet, upper part of dexter & sinister gules, between 2 torteaux; 2nd sides of shield, & joining in centre and 3rd, gules, two chevrons with- in a bordure, arg.



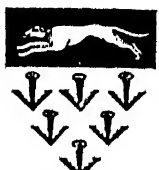
SMITH (of Islsworth)
Quarterly, 1st & 4th, az., a lion rampant, or; over all, a chevron counterchanged



HAWKINS
Per saltire, or & arg., on a saltire sable, 3 fleurs-de-lis of first, all within a bordure gobony, or and sa.



WYVILL
Arg., three chevrons interlaced, vair, a chief, or



ROBERTS
Arg., six pheons, sa., on a chief of second, a greyhound courant of first gorged, or



JOHN DE BEAUMONT
Az. semé-de-lis & lion rampant, or, over all a bend gobony arg. & gules



VISCOUNT DOWNE
Or., on a bend cotised sa., three annulets of the field



MACKWORTH
Party per pale indented, sable and ermine, a chevron gules, fretty or



WM. DE COURTENAY (Archbp. of Canterbury)
Or, three torteaux, on a label of three points az., as many mitres arg.



ROBERT DE VERE
Quarterly 1st and 4th az., 3 crowns or, within a bordure arg.; 2nd & 3rd, quarterly gules and az., in first quarter a mullet argent



Arg. a chevron gules between three cross crosslets fitché sable, all within a double treasure flory and counter-flory of the second



ARMORIAL BEARINGS OF SIR ARCHIBALD KENNEDY, MARQUESS OF AILSA.

1. Motto
2. Crest upon a wreath of his liveries, a dolphin naiant proper
3. Mantling gules, doubled ermine
4. Helmet
5. Coronet
6. Supporters: two swans proper, beaked and membered gules



JOHN DE HASTINGS, K.O. (Earl of Pembroke)
Quarterly De Hastings & De Valence & impaling France ancient and England quarterly

to put him in chains. For this she was beaten by Zeus and herself put in chains. Her annoyance with Paris (*q.v.*) for his judgement against her for the ownership of the golden apple led her to side with the Greeks in the Trojan War. As a married goddess, her special province was to preside over childbirth. The pomegranate, symbol of fertility; the cuckoo, in which form Zeus gained her favours; and the peacock were sacred to her. The Romans identified her with Juno (*q.v.*).

Heraclea. Ancient Greek city of S. Italy, on the Gulf of Taranto. Its site is near the modern village of Policoro, to the W. of Taranto. A colony of Tarentum and Thurii, founded c. 432 B.C., it became the seat of the general assembly of the Italiot Greeks. Near by, in 280 B.C., Pyrrhus defeated the Romans. Later it became a Roman municipium. Two important bronze tablets were found here in 1752; they bear on one side a Greek inscription relating to temple lands and, on the other, in Latin, four laws of Julius Caesar regulating its municipal affairs.

Many other ancient towns were named Heraclea, after Heracles.

Heraclea Minoa. An ancient Greek city of Sicily. It stood on the S. coast, W. of Agrigentum. Originally a colony of Selinus, it was called Minoa from a tradition that it was built by Minos. It was occupied by a band of Spartan colonists about 510 B.C. For long a bone of contention between Greeks and Carthaginians, it changed ownership many times, becoming an important Carthaginian naval station during the Punic wars. It later fell into decay, and few traces of its buildings now remain.

Heracleidae. In Greek legend, the sons and descendants of Heracles or Hercules. Zeus had willed that the sons of Hercules should rule in Peloponnesus, but Hyllus, the eldest son, and his brothers were expelled by Eurystheus, king of Argos, and forced to seek refuge at Athens. After several attempts the Heracleidae regained possession of their inheritance, and founded the kingdoms of Argos, Lacedaemon, and Messenia. The legend has a basis of historical fact—the conquest of Peloponnesus by invading Dorians, probably led by Achaean chiefs. This invasion is known as the return of the Heracleidae.

Heracleopolis. Greek name of the ancient city Heren-nisut at Ahnas, Upper Egypt. Situated on

the right bank of the Bahr Yusuf, 10 m. W. of the Nile at Beni Suef, 71½ m. above Cairo, it was the capital of Middle Egypt during the IXth and Xth dynasties. It was sacred to the ram-headed god Hershefi, whose correlation with Heracles occasioned its Greek name.

Heraclian (d. A.D. 413). Roman general and usurper. For the murder of Stilicho (408), he was made count of Africa by the emperor Honorius, to whom he rendered valuable assistance in putting down the usurper Attalus set up in Rome by Alaric. Having been raised to the consulship he proclaimed himself emperor and landed in Italy, but after a severe defeat returned to Carthage, where he was put to death by the emperor's orders.

Heraclitus (c. 540–480 B.C.). Greek philosopher. A citizen of Ephesus, he was known as the weeping philosopher from his pessimistic view of human life, and as the Dark from the obscurity of his style. Like his predecessors of the Milesian school, he referred all substances composing the material world to one element, but whereas Thales held that one element to be water and Anaximenes held it to be air, Heraclitus believed that all things were variants of fire, typical of absolute unrest, the perpetual dissolution of continuance. He also held that everything was in a state of flux or movement, like the stream of a river, and that any idea of permanency about anything was an illusion of the senses. Nothing exists, but only becomes, and all becoming is the result of the conjunction of opposites; "strife is the father of all things." The only permanency is to be found in the reason underlying all movement; this reason he identifies with Zeus. Becoming, the principle of Heraclitus, is the exact opposite of Being, the principle of the Eleatics. See Philosophy. *Pron.* Herra-cly-tus.

Heraclius (c. 575–641). East Roman emperor 610–641. Born in Cappadocia, son of the governor of Africa, he seized the throne at a critical period, the empire being threatened by the Persians in the E. and by the Avars and Slavs in the W. At length, having reorganized the army and borrowed money from the Church, Heraclius, after defeating the Avars, undertook a series of campaigns against Persia, and gained a decisive victory near Ninoveh (627) over Chosroes II.

This success, however, was counterbalanced by serious losses

of territory in the W. For the rest of his reign, Heraclius was chiefly occupied with religious disputes as to the nature of Christ, and issued an Ecthesis (edict) asserting that in spite of two natures there was only one will in Christ (Monothelitism). While thus engaged, a new foe had arisen—the Arabs, who made themselves masters of Syria and Egypt. Overwhelmed by anxieties, Heraclius left the empire at his death in a deplorable condition.

Heraeum (Gr. *Heraion*). Temple of Hera, about 6 m. from Argos, in Peloponnesus, ancient Greece. This temple was the centre of the worship of Hera for the whole Greek world. Burned down in 423 B.C., it was rebuilt with great splendour. Especially famous was the great statue of the goddess in ivory and gold by the sculptor Polycleitus. Considerable excavations have been made on the site, as a result of which terra-cotta figurines, vases, and other objects of art have been found.

Herakles or HERACLES. Greek form of the name of Hercules (*q.v.*).

Heraklion. Another name for the largest city of Crete. See Candia.

Herald (old Fr. *herault*). Name, of doubtful etymology, given to certain officials. In the Homeric age of ancient Greece, the herald or *kēryx* (one who proclaims) acted as confidential servant to the kings and princes, waited upon them at table, and acted as their representative. In historical times his functions were religious, political, and judicial. He examined the victims for sacrifice, recited prayers before any public business was undertaken, convened the public assemblies, summoned litigants to the court, instructed the proper officials to carry out its sentence, proclaimed the lists of those publicly honoured and of the victors of the Olympic games. The herald's person was sacred; he had free meals in the Prytaneum, a seat of honour in the theatre, and received a salary. His special badge of office was the staff, *kērykeion*, latinised as *caduceus* (*q.v.*).

In Rome, the herald (*praeco*, *caduceator*) was a less important person, no religious character being attached to his office. He was a public or private crier, who gave notice when anything was lost in the streets, and played a part at auctions like that of the modern auctioneer. There were also heralds in the service of the state and attached to the higher magistrates whose duties more or less corresponded to those of the Greek

kérykes. The *praeco* and *caduceator* were distinguished as the messengers of peace from the *fetiales*, whose responsibility was to declare war with certain solemn formalities.

In early medieval times the heralds acted as messengers of sovereign princes, and had, among other duties, to convey challenges, open negotiations for armistices and peace, and take part in matrimonial and other ceremonies. Thus they gradually assumed largely the functions of masters of the ceremonies and recorders of pedigrees and alliances. Hence, when armory arose and the knights began to decorate their shields and banners with distinctive symbols, to avoid confusion and ensure proper order being observed, the heralds were appointed to look after armory, register pedigrees, and see that knights observed conduct becoming their dignity. In England they were made into a college of arms.

Apart from the heralds who are members of the college many others were instituted from time to time, by kings of England and by princes. Thus a herald styled Bath king of arms, who does not belong to that corporation, was attached to the order of the Bath when revived by George I, and another king of arms, with no distinctive appellation, is an official



Herald. Norroy king of arms reading the proclamation of Queen Elizabeth II at Temple Bar, London, Feb. 8, 1952

of the order of S. Michael and S. George. Herald extraordinary may also be occasionally appointed. Until Tudor times many great nobles, such as the Percys, Nevills, earls of Salisbury, and Sir John Chandos, one of the original knights of the garter, had their own pursuivants, named after the family badge or crest, who acted as the family heralds and genealogists, as well as messengers to their masters.

HERALDRY AND COATS OF ARMS

* Anthony E. Wagner, *Richmond Herald*

In this work there are articles on all the chief terms used in heraldry, e.g. *Cadency*; *Charge*; *Cross*; *Quartering*; *Saltire*; *Supporter*. See *Coat of Arms*; *Knighthood*; *Peerage*; and articles on *Howard* and other noble families

In the strict sense of the word, heraldry embraces all those duties which fall within the domain of the herald, and so comprises genealogy, the rules of precedence and official ceremonial, and the art of armory. Generally, however, the term is restricted to the last-named branch, which is concerned with the devices placed on shields or banners as distinguishing marks of individuals, families, or territorial divisions, as well as the ornaments surrounding the shield.

Heraldry as a science, resting on hereditary descent of such devices as a fundamental fact, cannot be traced further back than the early 12th century, though there were signs of it nearly a hundred years earlier, and no doubt it owed a great debt to that art of symbolism adopted in remote ages and by many peoples to distinguish tribes and individuals. Some of the symbols or charges used in heraldry are unquestionably of

extreme antiquity. Such are the snake-like dragon, the lion, and the single and double-headed eagle, as well as such conventionalised floral and plant forms as the cinquefoil.

All these and many more may be found on the coins, pottery, and monuments of ancient Greece and Rome, often shown as decorating the shields or standards of warriors. Some of these charges may also be traced on Assyrian monuments and in the hieroglyphics of Egypt (where we see them representing dynasties, gods, and territorial divisions), and even among savage races chiefs and whole tribes are found using distinctive head-dresses or tattoo marks. Many of these symbols were totemistic, and to that degree were really hereditary to a family. But in the main, outside totemism and those symbols attributed to tribal or local divinities, the devices found in antiquity and among barbarian people were personal, and do not

often show stability even in that restricted sense.

This want of stability characterises the early heraldry of Europe. While it is extremely likely that over most of Europe certain totemistic, tribal, and territorial devices subsisted well into the feudal days, there is no direct evidence that they were used on shields, helmets, or standards. An important influence on the early development of heraldry was probably the tournament, which by the end of the 12th century was a widespread institution. Knights who took part in tournaments were leaders in war, and their personal and family emblems were important in both contexts.

Symbol of Identity

As the armour of the Christian knights became heavier and thus more effective as an agency for concealing individuality, the advantages of these identity symbols, serving as signs for rallying scattered henchmen, became self-evident, and were gradually adopted. Some of the best known feudal coats of arms appeared only towards the 13th century.

No heraldic symbol of any kind appeared on the great seals of kings of England before Richard I. His first great seal has no such device as three lions, but we see on the shield borne by his equestrian figure a lion rampant. The three lions passant guardant do not appear until his second seal.

Heralds are first heard of on the Continent late in the 12th century, but in England not until the reign of Edward I. Their primary concern was with the conduct of tournaments, but this from the first necessitated a knowledge of armorial bearings, and as time went on their concern with the latter assumed relatively greater importance. They made heraldic collections known as rolls of arms; and under Henry V, if not earlier, they had responsibility for ensuring that arms were not assumed without right.

The court of chivalry, under the constable and marshal, tried cases where the usurpation of arms was alleged, from the reign of Edward III to that of George II. Its most famous achievement was the trial of the issue between Sir Richard le Scrope and Sir Robert Grosvenor, both of whom claimed a golden bend on a blue field. From 1385 to 1390 a splendid array of French, Scottish, and Continental chivalry appeared to give evidence, and finally Richard II delivered judgement in favour of le Scrope. By

degrees the unsystematic recording of arms by the heralds developed into regular surveys called visitations, with the dual purpose of recording genuine arms and checking their improper assumption. Henry VIII in 1530 put these surveys on a strict legal basis which continued till 1688. The records of these visitations are preserved in the Heralds' College.

Although at first many of the armorial devices assumed were personal, the basis soon became in the main feudal and territorial; *i.e.* many of the most prized coats of arms were attached to fiefs. Consequently we find that men of noble birth and ancient lineage who became possessed of important fiefs by inheritance, marriage, or gift, commonly gave up their paternal arms for those of the territorial dignity.

In many more instances they were quartered or otherwise incorporated. Another peculiarity of these feudal territorial arms was that, with certain modifications, they were assumed or granted to sub-feudatory families or families related to the great chief. A good illustration of this is seen in the golden wheatsheaves of Chester, borne by the earls of Chester, and found on the shields of a large number of old Cheshire families, including the Grosvenors.

Armorial Complications

It was the medieval theory that the unaltered arms of a family belonged only to its head for the time being, and that his younger brothers and sons and even his heir in his lifetime must "differ" them in some way. With time, the increasing number of coats of arms in use made it progressively more difficult to difference one without producing an undue resemblance to some other; and differences were replaced by the marks of cadency. Finally even the use of these was dropped.

As time advanced the work of the professional armorists, though preventing chaos, introduced many complications, doing away with the charming simplicity of the early feudal days. These restrictions and complications went on steadily increasing, until by the 19th century the original beauty and direct appeal had vanished, too often under a mass of meaningless absurdities. Moreover, as blazoning and marshalling of arms became more complicated, so did the dexterity and bold spiritedness of the heraldic artist diminish. This deterioration of heraldic art became most swift in the early 18th

century and went on past the mid-Victorian period. Then came a revival of heraldry, a harking back to the feudal examples, which gave birth to a painstaking school of heraldic artists.

In blazoning, heralds distinguish four main divisions—the field (the surface of the shield or banner); tinctures (colours, metals, and furs); charges (animated creatures, celestial bodies, flowers, and plants, inanimate objects and conventional figures placed as distinguishing ornaments on the field); and externals, which include crest and badge, helmet, coronet or cap, supporters, mantling, and distinguishing devices.

Degrees of Coat-Armour

In coat-armour ten degrees were recognized. 1. Arms of dominion, belonging to a sovereign state. 2. Arms of pretension, borne in their entirety, in a shield of pretence over the paternal arms, or quartered, by a prince claiming dominion over another state. 3. Arms of community, belonging to religious, charitable, and scholastic establishments, corporate bodies, including cities and boroughs, chartered guilds and companies. 4. Arms of patronage, or arms of community and office borne by certain holders of office, such as bishops, abbots, heralds. 5. Arms of succession, borne by inheritors and grantees of fiefs and manors. 6. Arms of assumption, or arms of a vanquished foe assumed by the victor (more often part of the arms or crest were assumed). Some heralds made another division for arms of territorial assumptions, or those borne by a non-ruling claimant to a territory, which are practically identical with No. 2. 7. Paternal arms, descending from father to children, and in certain cases hereditary from the maternal side. 8. Arms of alliance, or the arms of a wife, borne in an escutcheon of pretence (a small central overall or *surtout* shield) if she is an heiress, or impaled otherwise; the arms of the heiress being quartered by the children with their paternal arms. 9. Arms of adoption, borne by strangers in blood by virtue of a gift by will or other deed, for which sanction by the sovereign is required. 10. Arms of concession, or arms of honourable augmentation, being complete coats of arms, parts of coats of arms or special charges or devices (crests or supporters) granted by the sovereign as a special favour.

The field or shield was plotted out into various sections to facilitate blazoning. The left side, as

viewed by the spectator, is called the *dexter*, the right the *sinister*, it being assumed that the shield is borne by the owner. The top is the chief, or in chief; the middle the fess point; the space between this and the chief is the honour point; and the bottom part the base.

As regards tinctures, gold and silver, together with the five colours, red, blue, green, black, and purple, to which a dark blood-red and orange were later added, were universally recognized; also ermine and those quaintly conventionalised other furs, vair and potent. It was generally laid down that metal should not rest on metal, nor colour on colour, but there are numerous exceptions, especially on the Continent.

First among the great body of charges come conventional or geometric figures, broad bands or crosses, called ordinaries. These are spacious and very properly may bear other charges. In early heraldry overloading was avoided, yet the heraldic artists always endeavoured to fill the shield or banner. If a king of England bore a shield broad at the top and narrowing to a point at the base, the topmost lion was a big, bold beast, the one beneath a little smaller, and the third a tiny animal. These fundamental ideas of design and the need to fill space appropriately had their influence on blazoning. Thus three charges on a shield, unless special directions are given, are borne two above and one below.

Bearing of Crests

A coat of arms may be complete without a crest. As a matter of fact, crests were either borne by the prescriptive right of long usage, or were the subject of specific mention in grants, the original assumption being that they should be borne only by warriors, or at least by those entitled to levy or to lead men-at-arms. No woman except a sovereign princess was entitled to use a crest.

Apparently in the course of visitations, applicants who considered a crestless armorial shield incomplete, or those anxious to advance pretensions, put forward old family badges or personal devices and got them recognized by the complaisant presiding herald as genuine crests. This abuse and the bad taste of the heralds account for so many absurd figures being employed as crests, many of which would be quite impossible ornaments to helmets intended for personal wear, which, of course, is the test of the genuinely old.

The use of supporters (*e.g.* the lion and unicorn in the British royal arms) came in fairly late; they were a matter of accidental growth, mere external ornamentations, but speedily recognized as of value in denoting alliance and territorial dominion. They were long only partially admitted as hereditary.

In later practice supporters are supposed to be borne only by sovereigns, princes, peers and their eldest sons, and those enjoying the right by special grant—a form of augmentation. But from the 16th century English heralds made it common form to grant supporters in connexion with arms of community, particularly those given to guilds and chartered companies.

Unfortunately the multiplication of rules begat a race of uninspired heralds who blazoned by rule of thumb and thought that piling on of detail and over-elaboration in marshalling tended to increase dignity, though it really detracted from novel simplicity and led to a succession of worthless follies.

The Appreciation of Heraldry

Heraldry meant much in the days when armorial bearings and other heraldic insignia appeared on signets and more formal seals, glittered in jewelled glass windows, glowed on tapestried or painted walls, even on personal garments, marked the possession of treasured books, and told graphically on the illuminated genealogical scroll or spreading family tree the story of cherished alliances. It played a useful part, appreciated by historian and antiquary and no less by the artist. Used with discretion, it still fills a place, and is as helpful to the family annalist as it is to the decorative artist of sound taste.

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Heralds' College. Name sometimes used for the College of Arms (*q.v.*), the society charged with the government of all matters relating to heraldry and coats of arms in England.

Herat. City of Afghanistan, sometimes called the key of India from its strategic position. It is

the capital of the prov. of the same name, and is situated on the Hari Rud, at an alt. of 3,000 ft., about 400 m. almost due W. of Kabul, and 60 m. from the Russian and Persian frontiers. Founded by Alexander the Great, it is a great centre of roads. It stands in a beautiful and fertile district, and makes fine carpets and silks. Pop. (est.) town, 76,000; province, 1,145,000.

Hérault. A river of France, 78 m. long. Rising on the slopes of Mont Aigonal, in the Cévennes, it flows first S. and then S.W. along the foot of the S. buttress of these mts., and issues into the Gulf of Lions near Agde. The chief towns on its banks are Vallerargue (Gard dept.), Amiane, Gignac (Hérault dept.).

Hérault. Maritime dept. of France. It adjoins the depts. of Aude, Tarn, Aveyron, and Gard, and its coast, consisting chiefly of a string of sandy lagoons (*étangs*), is on the N.W. of the Gulf of the Lion. It formed part of the old prov. of Languedoc. Towards the sea the ground slopes gently, but in the N.W. rise the Monts de l'Espinouse and Monts Garrigues, the southern flanks of the Cévennes. The principal rivers are the Hérault and Orb; part of the Canal des Étangs runs through the dept. from Aigues Mortes (Gard) to Cette (Sète), the Canal du Midi continuing to Agde, Béziers, and into the dept. of Aude.

The vineyards are the most important commercial feature of Hérault, and there are several important mineral workings, *e.g.* copper, lead, and building stone. Salt is produced from the neighbourhood of the lagoons, and Cette has a large fishing fleet. Montpellier is the capital; other towns are Béziers, Lodève, Bédarieux, Pézenas, and Frontignan. Area, 2,402 sq. m. Pop. (1954) 471,420.

Hérault de Séchelles, MARIE JEAN (1769–94). French Revolutionary. A Parisian, he was born Sept. 20, 1759. He was a lawyer and literary figure before he took part in the capture of the Bastille, and then as judge and member of the legislative assembly (president from Sept., 1792) moved to the extreme Left. Frequently president of the convention, he drew up the constitution of 1793 and was appointed to the committee of public safety. Having incurred the enmity of Robespierre, he was guillotined with the Dantonists, April 5, 1794.

Herb. Plant whose stem, from the absence of woody tissue, dies

to the ground annually. Herbs may be annual, biennial, or perennial. Annuals spring from the seed, flower, fruit, and die all within one season. Biennials during their first season accumulate a store of food in an underground rootstock which is expended the second season in the production of an aerial stem, flowers, and fruit; then they die. Perennials produce annual stems in succession during an indefinite number of years, such stems dying in autumn after their valuable contents have been withdrawn into an underground rootstock, tuber, bulb, or corm.

The word herbs is used by gardeners to indicate plants, whether herbs or shrubs botanically, used for flavouring in cookery, such as horehound, mint, parsley, rue, sage, tansy, and thyme. A herbalist is one who deals in herbs, especially those useful medicinally. Before the medical profession reached its present ubiquity, many persons resorted to herbalists in case of illness. A herbal is a book in which plants and their names are described.

Herbaceous Border. Name given to a strip of garden ground occupied mainly by hardy herbaceous perennial plants, that is, species that live on from year to year but whose stems die at the end of autumn, new growth arising from the base in spring; as distinct from plants of a woody nature such as roses and shrubs in general. The most favourable position for the border is in full sun. It can be backed by a fence or hedge or wall, or it can have a path (turf, gravel, or crazy paving) along the back as well as the front.

With one path only, taller plants should be kept at the back; otherwise the really tall growers should run down the centre. Spring, summer, and autumn flowering species are planted to secure an extended display. Colour schemes can be arranged by planting in blocks of white, blue, yellow, scarlets, and so on. Clumps of not less than three plants of a kind are more effective than single plants.

Permanent edgings include pinks, dwarf campanulas, thrift; and annuals and bulbous plants can be used to fill in blanks among the main subjects. The spent growth of the main occupants should be cut down almost to ground level in early winter. To maintain the vigour of the hardy herbaceous perennials, the root clumps should be lifted every third or fourth year and divided for replanting.

Herbarium (Lat.). Collection of dried plants attached to loose sheets of paper, arranged in genera, and these again grouped in the natural orders. In making such a collection, care should be taken to select typical and perfect specimens, showing all the parts of the plant, root, stem, leaves, flowers, and fruit. They are dried, under increasing pressure between many changes of fairly absorbent paper, before they are mounted, and then attached by narrow strips of gummed paper or by cotton stitches. The cabinet in which they are stored should not be placed against an outer wall, or the specimens will be attacked by mould. Camphor or naphthalene should be freely used in the cabinets, which should be frequently inspected, to keep away destructive insects. See Botany.

Herbart, JOHANN FRIEDRICH (1776-1841). German philosopher and educationist. He was born at Oldenburg, May 4, 1776.



J. F. Herbart,
German philosopher

and while a tutor in Switzerland, in 1797, made the acquaintance of Pestalozzi, whose system aroused in him an interest in education. In 1805 he became professor of philosophy at Göttingen, and in 1808 succeeded Kant at Königsberg. The result of his educational theories was seen in the foundation of a pedagogical seminary. In 1833, having incurred the displeasure of the Prussian authorities by his advanced ideas, he returned to Göttingen, where he died Aug. 14, 1841.

At first a follower of Fichte, Herbart later found himself at variance with him on the question of human freedom. He denied that man was free and independent of circumstances, and reverted to Kant's theory that behind the world of sense there were a number of real things, unaffected by the operations of the mind. These "reals," resembling the atoms of Democritus and the monads of Leibniz, are simple elements, differing in quality, which act and react upon one another in a struggle for self-preservation, and thus originate the physical world. The soul is one of these reals, whose reactions give rise to presentations which become ideas. These ideas act as forces striving for possession of the threshold of consciousness.

Herbart was the first to raise education to the dignity of a science. His views have had much influence,

especially in America, where there is a Herbart Soc. Consult The Secret of Herbart, F. H. Hayward, 1907.

Herbert, SIR ALAN PATRICK (b. 1890). British writer and politician. Born Sept. 24, 1890, he



Sir Alan Herbert,
British writer

was educated at Winchester and New College, Oxford, and was called to the bar in 1918. From 1910 he contributed to Punch, joining the staff in 1924. An outstanding wit, he published volumes of light sketches, satirical and topical verse, and attacks on the misuse of English. Of his novels The Water Gipsies, 1930, and Holy Deadlock, 1934, were best known, though a war book, The Secret Battle, 1919, was highly esteemed. As a librettist he excelled in comic opera and revue, e.g. Riverside Nights (with N. Playfair), 1925; Tantivy Towers; Derby Day; Streamline (with R. Jeans); Big Ben; Bless the Bride, 1947.

Herbert represented Oxford university as Independent Conservative M.P. 1935-50. In 1937 he introduced a bill amending the law of divorce; this was passed as the Matrimonial Causes Act (see Divorce). A warm defender of the individual against bureaucratic interference, he was knighted 1945. In the Second Great War he was a petty officer in the naval auxiliary patrol. He pub. his autobiography in 1950.

Herbert, GEORGE (1593-1633). English poet and divine. Born in Montgomery, Wales, April 3, 1593, younger brother of Lord Herbert of Cherbury, he was educated at Westminster School and Trinity College, Cambridge. He became fellow, 1616, and was public orator, 1619-27. Disappointed of court preferment under James I, he turned to the study of divinity. He was prebend of Leighton Bromswold, Hunts, with the stall of Leighton Ecclesia in Lincoln Cathedral, 1626, restored the church of St. Mary, Leighton; was rector of Fuggles-ton with Bemerton, near Salis-

bury, Wilts, 1630-33, where he repaired the church (St. John's) and rebuilt the parsonage. He married Jane Danvers, of Baynton, Wilts, 1629, and, dying of consumption, was buried in Bemerton church, March 3, 1633. The church at Bemerton was restored in 1866.

Herbert's saintly life at Bemerton is reflected in the manual A Priest to the Temple, or the



George Herbert,
English poet
From a print

Country Parson, His Character and Rule of Holy Life, first printed in 1652. His chief work, The Temple, Sacred Poems and Private Ejaculations, planned in reference to

church architecture, and packed with thought and precept, was first printed 1633, and ran through two editions in that year; by 1670, 20,000 copies had been issued. The MS., now in the Bodleian, was given by Herbert, on his death-bed, to his friend, Nicholas Ferrar, of Little Gidding.

Read by Charles I in prison and praised by Crashaw, Henry Vaughan, Baxter, and Coleridge, The Temple ranks with the best religious verse in the language. The Pilgrimage has been described as Bunyan's Pilgrim's Progress in miniature. The conceits in the verse are attributed to the influence of Herbert's friend, John Donne. Herbert found his chief relaxation in his devotion to music.

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George Herbert. The old church at Bemerton, near Salisbury, of which he was rector, and where he was buried in 1633

From

Herbert, Sir John Arthur (1895-1943). British administrator. Educated at Wellington and Harvard, he was commissioned in the Royal Horse Guards in 1916, and served on the Western Front. Retiring from the army in 1934, he entered parliament as Conservative at a by-election in Monmouth, becoming in 1937 private secretary to Lord Stanley at the India office. In 1939 he succeeded Lord Brabourne as governor of Bengal; his term was marked by great political difficulties, which obliged him to take emergency powers. His work in combating famine and organizing the war effort of the prov. overtaxed his health, and he was taken ill in Aug., 1943; resigned Oct. 22: and died Dec. 11.

Herbert of Cherbury, Edward HERBERT, 1st BARON (1583-1648). English philosopher, historian, and diplomatist. Born at Eytton-on-Severn, near Wroxeter, March 3, 1583, he went to Oxford when a boy of fourteen. He afterwards travelled much on the Continent, where he made the acquaintance of Isaac Casaubon and Constable Montmorency, and gained the reputation of a skilful and fearless duellist and man of pleasure. In 1614 he fought with distinction under the prince of Orange in the Netherlands and was twice ambassador to Paris. He was recalled owing to a dispute with Constable de Luynes as to the treatment of the French Protestants, and a second time in connexion with the proposed marriage of Henrietta

Maria of France and Prince Charles. His services were rewarded with an Irish and then an English peerage as Baron Herbert of Cherbury.



Lord Herbert of Cherbury, English philosopher
From a contem. portrait

At first a supporter of the royalist party, he subsequently went over to the parliamentarians. He died in London, Aug. 20, 1648.

Herbert of Cherbury is usually called the founder of English deism, a system of natural religion. He assumes that all men are alike in the possession of certain common notions, in which the fundamental truths are represented. The five common notions of natural religion are: the existence of a supreme being; the duty of worshipping him; virtue and piety are the most important

elements of worship; the necessity for repentance of sins; a future life with rewards and punishments. Revelation is possible to individuals, but must not be opposed to these five notions. Natural instinct is the faculty whereby the common notions as to the relations of things are apprehended and applied without the process of reasoning. His chief work is *De Veritate* (On Truth), 1624.

Herbert of Lea, Sidney HERBERT, LORD (1810-61). British politician. Born at Richmond,



Lord Herbert of Lea, British politician
After G. Richmond

Sept. 16, 1810, a younger son of the 11th earl of Pembroke, he was educated at Harrow and Oriel College, Oxford. He entered Parliament as Conservative M.P. for S. Wilts in 1833, and retained the seat till 1861. In 1834 he was made secretary to the board of control, and in 1841 secretary to the admiralty; there he remained until in 1845 he entered Sir Robert Peel's Cabinet as secretary at war. Still a Peelite, he returned to the same office in 1852, resigning in 1855 on the inquiry into the failure of the army organization in the Crimea. Herbert was responsible for sending thither Florence Nightingale. He returned again in 1859, but in 1861 resigned, having just been made a peer, and died Aug. 2. His two elder brothers died without issue, the second in 1862, and his two sons George Robert Charles and Sydney succeeded in turn as 13th and 14th earls of Pembroke.

Herberton. Town of Queensland, Australia. It stands 2,893 ft. above sea level, 82 m. by rly. S.W. of Cairns, its port. Once a mining centre, it still produces tin and some copper, wolfram, and other minerals. Pop. (est.) 900.

Herbertshöhe. Name of Kokopo (q.v.) when New Britain (then called Neu Pommern) was under German rule.

Herb Paris (*Paris quadrifolia*). Perennial herb, one of the family Liliaceae. It is a native of Europe and N. and W. Asia. It has a stout white, creeping rootstock, a round



Herb Paris, foliage and flowers

stem, bearing near its summit a single whorl of four large oval leaves, and above them the solitary flower, consisting of four large green sepals and four very narrow yellow petals. The eight or more stamens are continued as long points beyond the anthers. The ovary is purple, very large, and shining, and develops into a black four-celled berry. The flower has an offensive odour which attracts flies. The plant resembles *Trillium*.

Herb Robert (*Geranium robertianum*). Soft, hairy annual herb, member of the family Geraniaceae.



Herb Robert, leaves and flowers

It is a native of Europe, N. Africa, and W. Asia. Its leaves are divided into five leaflets, which are again finely lobed and divided, smelling disagreeably when bruised (hence its local name of Stinking Bob). The flowers are pale purple, streaked with red, produced all through the season. The whole plant often turns red.

Herculaneum (Gr. *Heraikleion*). Ancient Italian coast town, between Naples and Pompeii, at the foot of Mt. Vesuvius. Originally Oscan and closely connected with Greek Naples, it was occupied by the Samnites and finally by the Romans. In Nero's time it was greatly damaged by an earthquake, and in the autumn of 79 was totally destroyed, together with Pompeii, by an eruption of Vesuvius. The villages of Portici and Resina were built over the site. In 1719, during the sinking of a well, parts of the ancient city were discovered. Excavations were carried on thereafter at irregular intervals. The town had been buried to a depth of 50 feet under volcanic mud which had solidified, so its investigation presents great technical difficulties.



Herculaneum. General view of the excavations looking along one of the streets of the buried Roman city

In 1927 modern scientific excavation was undertaken by the Italian government.

The town was smaller, with far less commercial activity, than Pompeii. Its architectural remains are of less interest and variety, except its houses, which show points of interest not found at Pompeii; its works of art are superior, and include a picture of Theseus and the Minotaur, and exquisite bronzes. Great hopes were once aroused by the discovery, in a country house outside the walls, of a large collection of papyrus rolls, but they proved of little value. See Vesuvius; consult Herculaneum, Waldstein and Shoolbridge, 1908. Ercolano, A. Maiuri, 1932.

Hercules. Northern constellation situated between Lyra and Boötes. One of the Ptolemaic constellations, it contains several double and variable stars, and the globular cluster Messier 13.

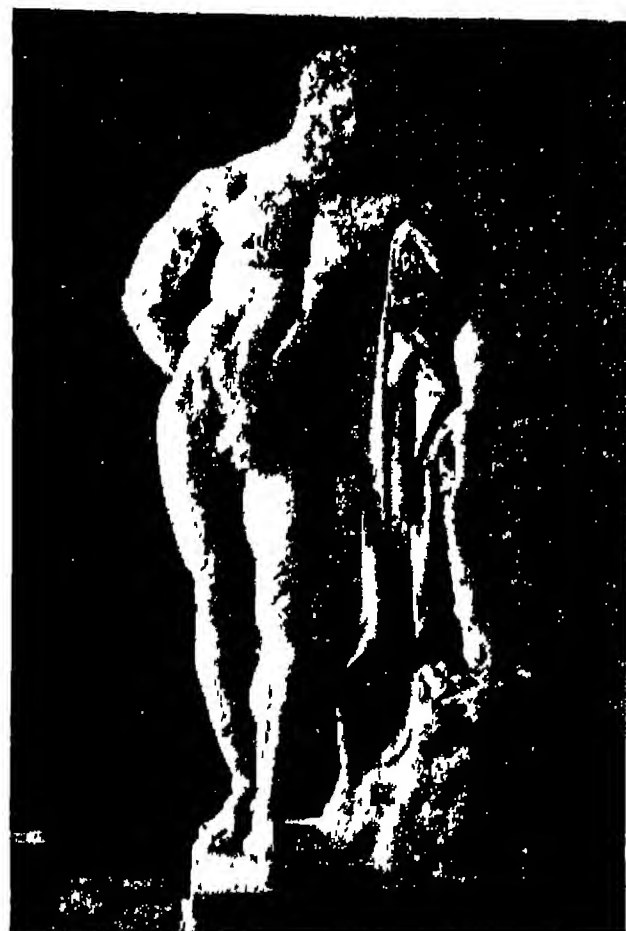
Hercules (Gr. *Heraklēs*). Hero in Greek classical mythology. He was the son of Zeus by Alcmēnē, wife of Amphitryon, king of Thebes. The jealous Hera, wife of Zeus, sent two serpents to destroy the baby Hercules in his cradle, but the infant strangled them both with his hands. Receiving the hand of Megara, daughter of the king of Thebes, as reward for having slain Erginus, king of Orchomenus, the oppressor of the Thebans, he had by her several children, whom, driven mad by his old enemy Hera, he slew. After being purified of this deed, Hercules was instructed by the Delphic oracle to go to Tiryns and serve Eurystheus, the king, for twelve years.

It was for Eurystheus that he performed the celebrated Twelve Labours: (1) The slaying of the Nemean lion, which he strangled

with his own hands; (2) The destruction of the many-headed Hydra of Lerna, a swamp near Argos; (3) The capture alive of the Arcadian stag, with golden antlers and brazen feet; (4) The capture alive in a net of the Erymanthian boar; (5) The cleansing of the stables of Augeas, which he carried out in a night by turning the rivers Alpheus and Peneus through them; (6) The destruction of the Stymphalian birds, monsters with brazen beaks and claws, and feeders on human flesh; (7) The capture of the mad bull which Poseidon had sent to Minos, king of Crete; (8) The capture of the man-eating horses of Diomedes, king of the Bistones in Thrace; (9) The taking of the girdle of Hippolytē, queen of the Amazons; (10) The seizure of the oxen of Geryon, the three-headed monster of the island of Erytheia; (11) The taking of the three golden apples from the garden of the Hesperides; (12) The bringing of Cerberus, the three-headed dog of Hades, from the lower world.

Besides these labours Hercules performed many other deeds. In the war between the gods and the giants he assisted Zeus to victory; he accompanied the Argonauts in the expedition in quest of the Golden Fleece; and he rescued Hesione, daughter of Laomedon, from a sea-monster. Going mad a second time, he murdered his friend Iphitus. Ordered by the Delphic oracle to work three years for wages as an atonement and to give the wages to Eurystus, father of Iphitus, he entered the service of Omphalē, queen of Lydia. On a visit to Calydon he won the hand of Deianira, who, becoming jealous, sent him a poisonous shirt, steeped in the blood of the centaur Nessus. Hercules put the shirt on and the

poison caused him such pain that he tore strips of flesh from his body in his attempt to pull off the shirt. In this condition he was brought to Trachis, and made arrangements for his own funeral pyre. When the pyre began to burn, a cloud descended upon it in which Hercules was borne away to Olympus. The worship of Hercules was first introduced to Greece by the Phoenicians, the original object of adoration being the Babylonian sun god Baal, who goes through twelve labours as he goes through



Hercules. Antique colossal statue known as the Farnese Hercules
Naples Museum

the twelve signs of the Zodiac. In Italy the worship of the Greek Heracles was combined with that of an old Italian hero. *Pron. Her-cu-leez.* See Greek Art.

Hercules, PILARS OF. Ancient name for the rocks forming the entrance to the Mediterranean Sea, i.e. Calpe (Gibraltar) in Europe, and Abyla (Ceuta) in Africa. Various legends describe them either as torn asunder by Hercules to admit the Atlantic or as joined together to keep out the ocean monsters.

Hercules Beetle. Large species of beetle. Belonging to the genus *Dynastes*, it is found in the tropical



Hercules Beetle. The male carrying his mate between his horns

districts of America. It is often between five and six inches long; and the male has a pair of large horns which somewhat suggest the pincers of a crab.

Hercynian Forest. In ancient geography, a vast forested mountain region N. of the Danube. Caesar in his commentaries on the Gallic War says it took nine days to cross, while in some parts 60 days' march did not avail to reach its limits. It seems to have included the modern Switzerland, the entire Alpine mass, Transylvania, and part of Russia.

Herder, JOHANN GOTTFRIED VON (1744-1803). German critic and poet. He was born at Mohrungen, East Prussia, Aug. 25, 1744, of humble parentage. At Königsberg university he was much influenced by Kant. He became a school teacher and pastor at Riga in 1764, and thanks to Goethe's interest became first preacher at Weimar, 1776. He had already published strong criticisms of Lessing's *Laocöon*, in *Kritische Wälder* (Critical Forests), 1769, and other writings.

Herder occupied a dominating position among critics of his period. His love for the songs of the people as supporting his theory that poetry was the natural language of man bore fruit in his *Stimmen der Völker in Liedern*, 1778-79, and other works. One of his chief works is the *Ideen zur Philosophie der Geschichte des Menschheit* (Ideas on the Philosophy of the History of Mankind), 1784-91, Eng. trans. 1800. Herder died at Weimar, where he was vice-president of the consistory, Dec. 18, 1803. *Consult* Herder and his Times, H. Nevins, 1884.

Herdman, SIR WILLIAM ABBOTT (1858-1924). A British scientist. Born in Edinburgh, Sept. 8, 1858, he studied at the academy and university there. His chief subject was zoology, and having been on the Challenger expedition, he was for a short time a demonstrator of zoology in Edinburgh. Made professor of natural history at Liverpool in 1881, he began his work of investigating the ocean. He helped to found a marine biological station at Port Erin, Isle of Man, while for the British government he investigated the pearl fisheries of Ceylon. Herdman served the British Association as general secretary, and in 1920 he was its president. His many honours included the F.R.S. and his writings *The Fauna of Liverpool Bay*, 1896-1900.

First professor of oceanography at Liverpool from 1919, he died July 21, 1924.

Heredia. Central province of Costa Rica. Its surface is mountainous, the highest point being the peak of Desengano, in the centre, which attains 6,310 ft. The uplands afford splendid pastures for the rearing of cattle, and the fertile valleys produce much coffee, which is exported. Pop. (1950) 51,650.

Heredia, the capital of the prov., stands on a plateau at an alt. of 3,785 ft., about 5 m. by rly. N. of San José. A well planned town, with wide streets, and substantial



J. M. de Heredia,
French poet

buildings, it is linked by road with Cartago and Alajuela. Pop. (1950) 11,936.

Hérédia, JOSÉ MARIA DE (1842-1905). French poet. Born at Fortuna Cape-

yere, Santiago de Cuba, Nov. 22, 1842, of mixed French and Spanish origin, he was educated in Paris,

and early became a disciple of Leconte de Lisle, and a member of the Parnassian school of poets, who regarded poetic form as being of supreme importance. His sonnets, collected under the title of *Les Trophées*, 1893, place him among the greatest writers in this species of poetry. He died Oct. 3, 1905.

Heredia, PEDRO AND ALONSO DE. Two brothers who conquered Colombia for Spain between 1530 and 1545. Pedro was the founder of the city of Cartagena.

Hereditament (late Lat. *hereditare*, to inherit). Term of English law. It refers to property that can be inherited, i.e. which goes to the heir and not to the personal representative. The term is wider than the term real property. It includes titles, advowsons, rights of common, rights of way, certain offices —e.g. the office of earl marshal of England is hereditary in the family of the dukes of Norfolk—dignities, e.g. peerages and baronetcies, franchises, e.g. markets and ferries, pensions, annuities, and rents. Some of these, such as rights of common and rents, issue out of land; others are purely personal, like peerages and pensions.

HEREDITY: A BIOLOGICAL PROCESS

Gomys J. A. Berkeley, Lecturer, Chelsea Polytechnic

The group of articles to which this belongs includes Biology; Eugenics; Evolution; Life; Mendelism; Reproduction; Sex. See also Cell; Cytology; Family; Genetics; Instinct, etc.

Heredity is the phenomenon of the transmission of characters and qualities of organisms to subsequent generations. It is the direct result of reproduction in which process new organisms are initiated as masses of living material derived from their parents.

Every organism, so far as is known, originates in this way and grows to show numerous recognizable features of structure and behaviour. The process of growth itself is dependent on the parental provision of living substance and, among other things, on the intake of material, e.g. food or its equivalent, from the surroundings. So we may say that every organism is the product of the interaction of its vital inheritance and its environment, and this is also true of its characters. Some of these, e.g. those by which we recognize the various kinds of plants and animals, appear in generation after generation, no matter how the environment varies: an elephant has a trunk and tusks whether born and reared in the tropics or in a zoological garden; a monkey puzzle tree is a monkey puzzle whether grown in Chili or at Kew.

Hence it must be presumed that apart from providing the conditions suitable for the life of the organism, the environment has little effect on such characters. Their appearance must be due essentially to the nature of the vital material provided to initiate each generation by its parents. They are heritable characters and their transmission is due to heredity. Many characters both structural and functional, besides those diagnostic of species, belong to this category, though the constancy of their appearance may not be as marked.

On the other hand, such characters as the callousity of labourers' palms, the tanned skin of the white man caused by exposure to intense sunlight, and the blue coloration of normally pink hydrangea flowers, become apparent or result from modification of pre-existing features only under certain conditions. In these instances, although the vital material must have a capacity to change so as to exhibit the particular character, the actual change is induced by the environment, and hence the character which results is said to be an

induced or acquired character or a modification.

In general the parts of organisms which are concerned with their everyday activities, their bodies or somata, in contrast to their reproductive cells, must have prolonged intimate relations with the environment in order to perform their functions; for the reproductive cells such relationship is at most transitory. Hence it is not surprising that induced characters are frequently seen in somata and not usually in reproductive cells, nor, since the induced characters are modifications of somata and new organisms are derived from reproductive cells, that modifications are not usually heritable.

In this connexion it is necessary to realize that in mammals generally, where the unborn offspring is carried by the mother, peculiarities in its nurture may modify its inherited nature and so, when it begins its independent existence, it may already have acquired characters which are not part of its heritable constitution. In the same way infection by pathogenic organisms may occur before birth, but the resulting disease is not to be regarded as inherited since it was not present *ab initio*. That is not to say that no disease is heritable. A number of physiological diseases, defects in the functioning of digestive and excretory organs, brain and blood, as opposed to pathogenic diseases due to the presence of foreign organisms, are known to be heritable, as are predispositions to infection by certain pathogens such as *bacillus tuberculosis*.

Transmission of Characters

In some instances there may be a semblance of transmission of acquired characters. Offspring which have the same heritable constitution as their parents, growing under similar conditions, will be likely to acquire for themselves characters previously acquired by the parents, and so it may appear that the character has been transmitted, but, unless the character appears again without the assistance of environmental influence, it cannot be regarded as inherited. A deeply saturating influence may occasionally affect the parental body and also bring about a modification in the reproductive cells so that the offspring come to be different, but when it does so the difference seen in the offspring is usually of another kind from that which is seen in the parental bodies. Should such a modification of

germ cells occur, the peculiarity resulting from it in the offspring is likely to be repeated in later generations. Thus, despite the facts that heredity tends to the regular reappearance of characters in succeeding generations and environmental effects tend to be limited to the bodies of individuals, should reproductive cells be affected, a corresponding heritable change will occur. (*But see Lysenko.*)

Variations of Incept

What an organism can be, and how it can behave, depend primarily on its material constitution, and this depends on the incept handed on from the previous generation. The nature of the incept differs with the method of reproduction. Many plants can multiply by vegetative means, *e.g.* strawberry plants, whose stolons root at their nodes, the internodes rotting to separate the new plants so established. In these instances the new individuals seldom show any differences in their features from those of their parents: they are in fact parts of the body of their one parent growing separately. Much the same is true of lowly animals arising by fission, *e.g.* amoeba, and by budding, *e.g.* hydra, or of plants, of which there are many, that grow from asexual spores. When, however, sexual methods involving two parents are used, and should those parents differ, it is obvious that no one of their offspring can resemble both in all particulars; the child of a brown-eyed father and a blue-eyed mother cannot have a pair of eyes which are both blue and brown. The sort of thing that may happen in such circumstances is discussed under Mendelism.

Mendel's original discoveries published in 1865 were the result of breeding experiments mainly on peas. He found, when he crossed a suitable tall pea plant with another that was dwarf, that the offspring resembled in stature one parent only—the tall one. The dwarf character did not, however, disappear from the race for ever. Breeding from the tall offspring gave a third generation, some only of which were tall, others were dwarf. Thus the dwarf character must have been latent (Mendel called it recessive) in the tall plants produced by the original cross. On the basis of experiments such as these Mendel postulated that an organism contains a number of "unit characters," that suitable characters of related organisms may be contrasted in pairs, and of any such pair one is dominant over

(appears to the exclusion of) the other (the recessive) when they are both inherited. Despite this both dominant and recessive characters may be transmitted separately to different members of the next generation. Such separate transmission of characters inherited though not necessarily exhibited by an organism Mendel explained by supposing that gametes (*q.v.*) can each carry that which determines (the determinant factor or gene for) one only out of any pair of contrasting characters, and it is this "purity of gametes" which makes the reappearance of a recessive character possible. The tall plants resulting from the original cross inherited a gene for tallness from their tall parent and one for dwarfness from their dwarf parent. They were tall owing to the dominance of the tall character. None of their gametes, however, could carry the genes for both characters, so some carried one and others carried the other. In breeding from the tall plants there could be no control of the actual unions of gametes, and fusions happened between similar or dissimilar gametes purely by chance. If a "tall" gamete united with another of its kind, the resulting plant inherited only "tall" genes. It was homozygous for tallness and grew into a tall plant. If a "tall" gamete united with a "dwarf" gamete, the plant was heterozygous and, because of dominance, tall like those of the previous generation. When two "dwarf" gametes fused, however, the plant was homozygous for dwarfness, and the dwarf character reappeared because there was no inheritance of tallness to mask it.

Mendel's Theories

In general, the characters of an organism depend on the genes present in the gametes which united for its initiation, not on the characters exhibited by its parents. The essential feature of the sexual union is bi-gametic rather than bi-parental in this respect. In fact, the tall plants produced by Mendel's original cross were allowed to pollinate themselves, as peas normally do, so that their offspring were (setting aside the alternation of generations) uni-parental.

It is apparent from the foregoing that although there are only two phenotypes (visibly different kinds), tall plants and dwarf plants, there are three genotypes (types by genetical constitution), homozygous tall, homozygous dwarf, and heterozygous plants.

Of the genotypes, the first two each produce gametes of one kind only and hence can transmit to their offspring only that character which they themselves exhibit. The heterozygous plants, on the other hand, form two kinds of gametes, and so can transmit each character to different offspring despite the fact that they show only the dominant one. The gene which is actually passed on will cause the appearance of the appropriate character only if it is dominant or if the gamete concerned unites with another bearing the gene for the recessive character.

Breeding Experiments

Reverting to the brown-eyed father and the blue-eyed mother, it is now clear that unless we know which of the two characters is dominant and the genetical constitution of the parent which shows that character, we are in no position to predict the eye colour of their children. Facts such as these, when they relate to plants and animals, may be determined by direct breeding experiments and have been so determined in a number of instances. Moreover, when breeding experiments are conducted in such a way as to provide numerous offspring, the numbers of the various kinds of these are found to bear definite proportional relationships to one another according to the genetical constitution of the parents. For example, a cross between two heterozygous tall pea plants gives homozygous tall plants, heterozygous tall plants and homozygous dwarf plants in the proportions of 1:2:1, and between a heterozygous tall plant and a homozygous dwarf gives equal numbers of heterozygous tall and homozygous dwarf.

All cases are by no means as simple as this. Observable characters may be determined by the interaction of genes; dominance may not be complete, and so on. But given a sufficiently extensive and descriptive family history, an expert could ascertain how pairs of characters behaved in relation to one another and the genetical constitution of any individual included. Inductive methods of this kind are used, because direct experiment is not feasible, in attempts to understand human heredity, but the data available are often scanty and so lead to deductions of probabilities rather than certainties.

THE CHROMOSOMES. The physical basis of Mendelian heredity is now known to rest in the

chromosomes and their behaviour. Each gamete nucleus normally contains a haploid set of chromosomes (*see Cytology*) and, when gametes fuse, two such sets are brought together into the nucleus of one cell in which it is often possible to distinguish the pairs of homologous chromosomes of the diploid set. At some time in the life history varying with different organisms, before gametes are again formed, meiosis occurs, and the homologous chromosomes of the two sets are separated into different nuclei. So we have only to assume that the gene for any character is present in one chromosome and the gene for the allelic (alternative) character is in its homologue, and the mechanism leading to the purity of the gametes is apparent. The genes are separated into different gametic nuclei when the homologous chromosomes disjoin during meiosis.

The assumption that genes are resident in the chromosomes is supported by a number of cases known, where the nuclei of organisms having a certain character contain a chromosome which is, under the microscope, distinguishable by its structural peculiarity from its fellows. The character does not occur therefore in the absence of the peculiar chromosome nor is it absent when that chromosome is present.

Sex Chromosomes

One of the simplest illustrations of this is found in sex chromosomes. The fruit-fly *Drosophila melanogaster* has nuclei containing four pairs of chromosomes. In female flies, members of each pair are morphologically identical, but in male flies one member of one pair is somewhat larger than its homologue and is characteristically hooked. In man there are 24 pairs of chromosomes, the pairs being essentially alike in females, but in the male one member of one pair is smaller than its fellow.

It must not be inferred that along any line of inheritance there will be found only two recurrent types. In any species there may be recognized many characters, and these are normally transmitted from generation to generation in linked groups (*see Cytology*). Each group of characters, apart from its relations with the allelic characters, behaves independently of any other group. Out of a number of allelic pairs, A and a, B and b, C and c, etc., A is as likely as a to be carried by the same gamete that carries B

or by that which carries b; B and b are equally likely to be carried with C or c and so on. An individual heterozygous for three linkage groups A and a, B and b, C and c could form gametes containing them in the following mixtures: ABC, aBC, AbC, abC, ABc, aBc, Abc, abc. If there are *n* linkage groups 2^n mixtures of them are possible.

Linked Groups of Characters

Linkage and the independent assortment of linked groups of characters have been shown by cytogenetical experiments to be due to three facts: characters linked in the same group result from genes present in one chromosome; allelic genes occur in homologous chromosomes (*see Cytology*); in meiosis, homologous chromatids are separated into different nuclei accompanied, according to chance, by one or other member of every other pair of homologous chromatids. Again, although groups of characters are normally transmitted together, the linkage groups are sometimes broken, and recombinations of characters occur. So the constitution and behaviour of the chromosomes tend to cause characters to recur in successive generations in varying combinations.

On the other hand, the sum total of the characters of any line is not invariable. New characters may arise. Genes themselves may occasionally undergo modification and produce new characters in the organism containing them. These gene mutations, as they have been called, serve to increase the number of possible character combinations. The character induced by the mutated gene is generally found to be allelic to that controlled by the gene which became modified and to its original allele (alternative), so where in any line there were originally two possibilities and a gene mutation occurs, there then come to be three. In addition, occasional aberrant behaviour of whole chromosomes or nuclei may lead to gross modification of the nuclear complement and so to modification of characters.

NON-NUCLEAR HEREDITY. It is upon the remarkable similarity in the behaviour of chromosomes and contrasting characters that the chromosome theory of heredity is chiefly based. So few instances of inheritance have been investigated which cannot be explained on this basis that there is a tendency to ignore the possibility of any other mechanism. In many

instances, truly, it is impossible to show that male gametes consist of anything in addition to nuclear material, and in these it would seem that all characters derived from the male parent must be transmitted by the nucleus. But egg cells always have considerable cytoplasm, and the nuclei of male gametes are sometimes surrounded by demonstrable cytoplasmic envelopes which, in the sexual process, fuse with the cytoplasm of the female gamete. Thus in all instances new individuals are endowed with cytoplasm, it may be by both parents, it may be by the female only, and there is no evidence that this cytoplasm does not carry heritable qualities.

Genetical Experiments

That cytoplasmic inheritance is not yet fully investigated may be due to intrinsic difficulty. Genetical experiments depend essentially on difference in characters, and when differing characters within a species are investigated, they usually behave in the Mendelian manner, and hence may be ascribed to genes in the chromosomes. The natural inference is that if characters are transmitted by the cytoplasm, there are seldom in a species easily recognizable differences to serve as a basis for experiment. Moreover, the cytoplasm itself usually has no features comparable with the chromosomes of the nucleus by which its uniformity or otherwise in related individuals can be visually tested.

A few crosses have been made, however, which prove that the nature of the cytoplasm can affect characters. Thus when two species of willow herb, *Epilobium luteum* and *E. hirsutum*, are crossed, the hybrids have different characters according to which plant is used as the "female" parent. In the sexual union of these plants, as in flowering plants generally, both gametes contribute equal quantities of nuclear material to the zygote, but the maternal gamete provides most if not all the cytoplasm. So it would appear that the differences in the hybrids are due to the different cytoplasm of the egg cells. The probability is enhanced by the fact that when

the hybrid derived from a *luteum* egg is back-crossed with *hirsutum* pollen, the characters of the *luteum* egg hybrid are again evident in the offspring. Repetition of back-crossing through 14 generations produces the same result in each successive generation.

Even in those numerous instances where differential distribution of characters is clearly due to the nuclear mechanism, it is the cytoplasm that forms the chief part of the system which develops to show the heritable characters. The nuclei without the cytoplasm would be ineffective. Thus it appears necessary to consider the cytoplasm as reacting with the nuclei for the production of differential characters.

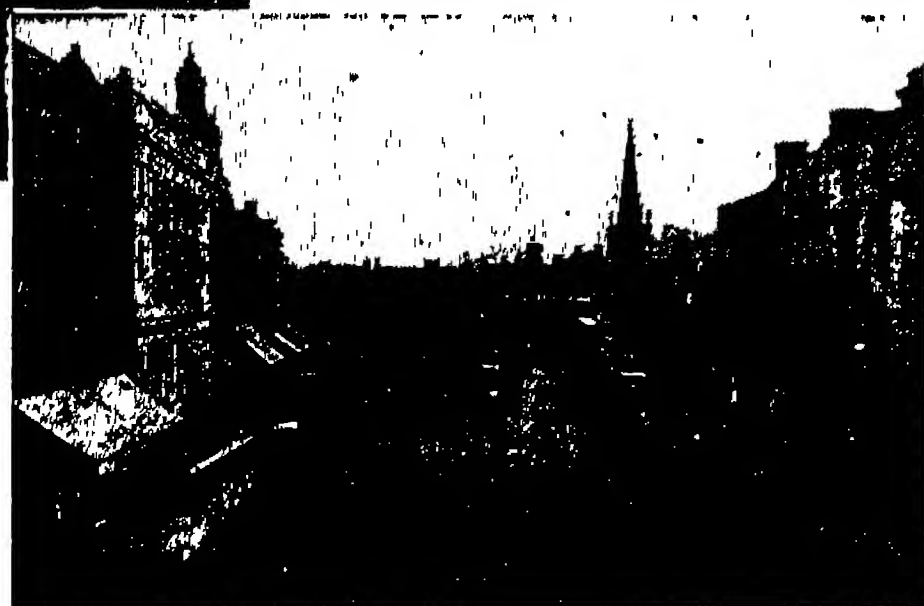
In a number of the lower plants chloroplastids are known to be passed from generation to generation. This is so in some species of the green alga *Spirogyra*, whose vegetative cells each contain a nucleus and chloroplastids. When sexuality occurs, the vegetative protoplasts are slightly modified to become gametes, and during their sexual union their nuclei fuse, and the plastids of one gamete degenerate but those of the other persist to initiate the plastid content of the new plant.

In sum, all parts of the protoplast which are handed on from

that character. Alternatively, uniformity might be engendered by the cytoplasm if the usual absence of visible difference between the cytoplasm of related individuals is truly indicative of identical constitution, or by any other protoplasmic structures which were not differentially distributed.

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Hereford. City, mun. bor., and co. town of Herefordshire, England. It stands on the Wye, 144 m. W.N.W. London, and is served by two railway lines, being a railway centre of some importance. The notable building is the cathedral. Exhibiting several styles of architecture, this was begun about 1079, on the site of an earlier one, and was completed about 1110. Additions and alterations were



Hereford. The main street, known as High Town. The timbered building in the background, known as The Old House, was built in 1620. The tower and spire are of All Saints' Church. Upper picture, the bridge over the Wye, with Cathedral tower beyond

generation to generation may be concerned in heredity. Most cases of differential inheritance of characters so far investigated may be attributed to the functioning of the nuclear mechanism, though a few are known in which the type of cytoplasm is responsible. But

uniform distribution of a character in a race would result if all individuals were homozygous for

made in the 13th and 14th centuries; restorations after the western tower fell, 1786, and in the 19th

century; in 1900-05 the west front was reconstructed. Features are the fine nave, the Norman font,



Hereford arms

the shrine of Cantelupe, the tower lantern, and the modern screen. The Lady Chapel and the crypt are notable, as is the library with its chained books. The cathedral possesses a unique map of the world, c. 1305.

Other buildings are the Old House (1621) in High Town, now a museum with local period furniture; the bishop's palace and the beautiful college of the vicars' choral; S. Ethelbert's and Coningsby hospitals, both old foundations; the latter being built in 1614 on the site of a building occupied by the Knights Hospitallers. The schools include the cathedral school. All Saints and S. Peter's are interesting churches. Hereford has a town hall, shire hall, art gallery, and public library and museum. There are only a few remains of the castle and of the town walls. The former is now represented by Castle Green, a public promenade with a memorial to Nelson. Every third year is held the Three Choirs' Festival (*q.v.*).

The chief industries are the making of cider, tanning, brewing, fruit canning and preserving, tile making, light steel, and a trade in agricultural produce. The county owns the racecourse and markets.

Hereford owes its historical importance to its position on the Welsh border, while as a bishopric it dates from about 676. A castle was built for its protection and this was frequently assailed, the last occasion being during the Civil War. In the Middle Ages the citizens obtained the right to hold markets and fairs. They had a merchant guild and the city was soon a corporate town, also a centre of the trade in wool and leather. Weaving was carried on, gloves were made, and there was a mint. From 1295 to 1885 Hereford sent two members to parliament; until 1918 it sent one. It now gives its name to a county constituency. Pop. (1951) 32,490.

Hereford, EARL OF. English title. William Fitzosborn, one of the Norman leaders at Hastings, was made earl of Hereford in 1067. Between then and his death in 1071 he was chiefly defending the borders of England against the Welsh, and putting down rebels elsewhere. His younger son, Roger Fitzwilliam, succeeded to the earldom, but in 1075, for conspiring

against the Conqueror, he lost his lands and his freedom. Miles of Gloucester, a powerful baron in the reign of Stephen, and a stout partisan of the Empress Matilda, was made earl of Hereford in 1141.

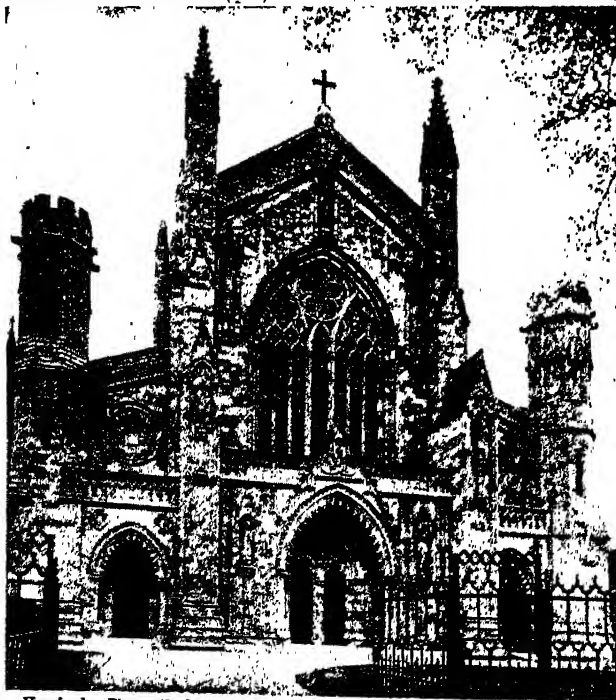
When his last son died childless, his lands passed to his daughters, one of whom, Margaret, was the wife of Humphrey Bohun. Their grandson, Henry, was made earl of Hereford in 1199, and his descendants held the title until the last male Bohun died in 1373. In 1397 Henry, afterwards Henry IV, who had married an heiress of the Bohuns, was made duke of Hereford, and when he became king this title was merged in the crown.

Hereford, Viscount. English title, the oldest of its kind, borne by the family of Devereux. Walter Devereux, 10th Baron Ferrers of Chartley, a title dating from 1299, was made Viscount Hereford in 1550. He had fought in France for Henry VIII. His grandson and successor was made earl of Essex and the viscountcy was held by the earls until Robert, 3rd earl of Essex, died in 1646. The titles were then distributed and Sir Walter Devereux, a descendant of the 1st viscount, became Viscount Hereford. His descendants still hold the title, Robert Milo Leicester (b. 1932) becoming 18th viscount in 1952.

Hereford. Hardy breed of cattle raised in Herefordshire and neighbouring counties. The body is red, while the face and mane, chest and abdomen are white; the legs are often white up to the hocks. Pure Herefords are of small esteem for dairying purposes, but they are fine beef-producers and are in favour on the cattle-ranches in Canada, Australia (especially Queensland), and the U.S.A. See Cattle.

Herefordshire. County of England. With an area of 842 sq. m., it is almost circular in shape. It is fairly level in the centre, but on its borders are hills, the Malverns in the E. and the Black Mountains in the S. The chief river is the Wye, which flows across the county. Other rivers, tributaries of the Wye, are the Lug, Arrow, Dore, and Frome. The Tems is a tributary of the Severn. The county town is Hereford; other towns are Loominster, Ledbury, and Ross.

Hereford is an agricultural county, chiefly famous for cider, perry, and cattle, while the usual English cereals are grown. Orchards abound and hops are grown, and the sheep have a high valuation. The railways which serve the county all converge upon



Hereford. The cathedral, showing the west front, which was reconstructed 1900-05

Hereford. It is in the diocese of Hereford and the Oxford circuit: it is divided into 12 hundreds, and forms two co. constituencies.

Having been a border county, Hereford contains some hundred castles, the chief being Richard's Castle, Clifford, Weobley, Hereford, Wilton, Goodrich, and Wigmore. There was a good deal of fighting here in the centuries after the Norman Conquest, and Hereford was an important place, much of the land being held by the lords marchers, families such as the Cliffords and Mortimers. As the

the geographer, belonged to a family long established at Eyton, near Leominster. The Elizabethan poet John Davies of Hereford took his name from his birthplace. Richard Knight, an antiquarian, and his brother Thomas, a leading horticulturist, were born at Wormsley Grange. Nell Gwynn is said to have been born in Hereford. Thomas Traherne came from the same city.

David Garrick was born at the Angel Inn, Hereford; Sarah Siddons passed her early life in the county, and her brother, Stephen

The King's England vol., ed. A. Mee, in 1938; English County, a survey, in 1947; Herefordshire, H. L. V. Fletcher, in 1948.

Herefordshire Regiment. Regiment of the British army formed when the Territorial Force, now the Territorial Army, was organized in 1907. It consists solely of territorial battalions, and for administrative purposes is attached to the corps of the King's Shropshire Light Infantry.

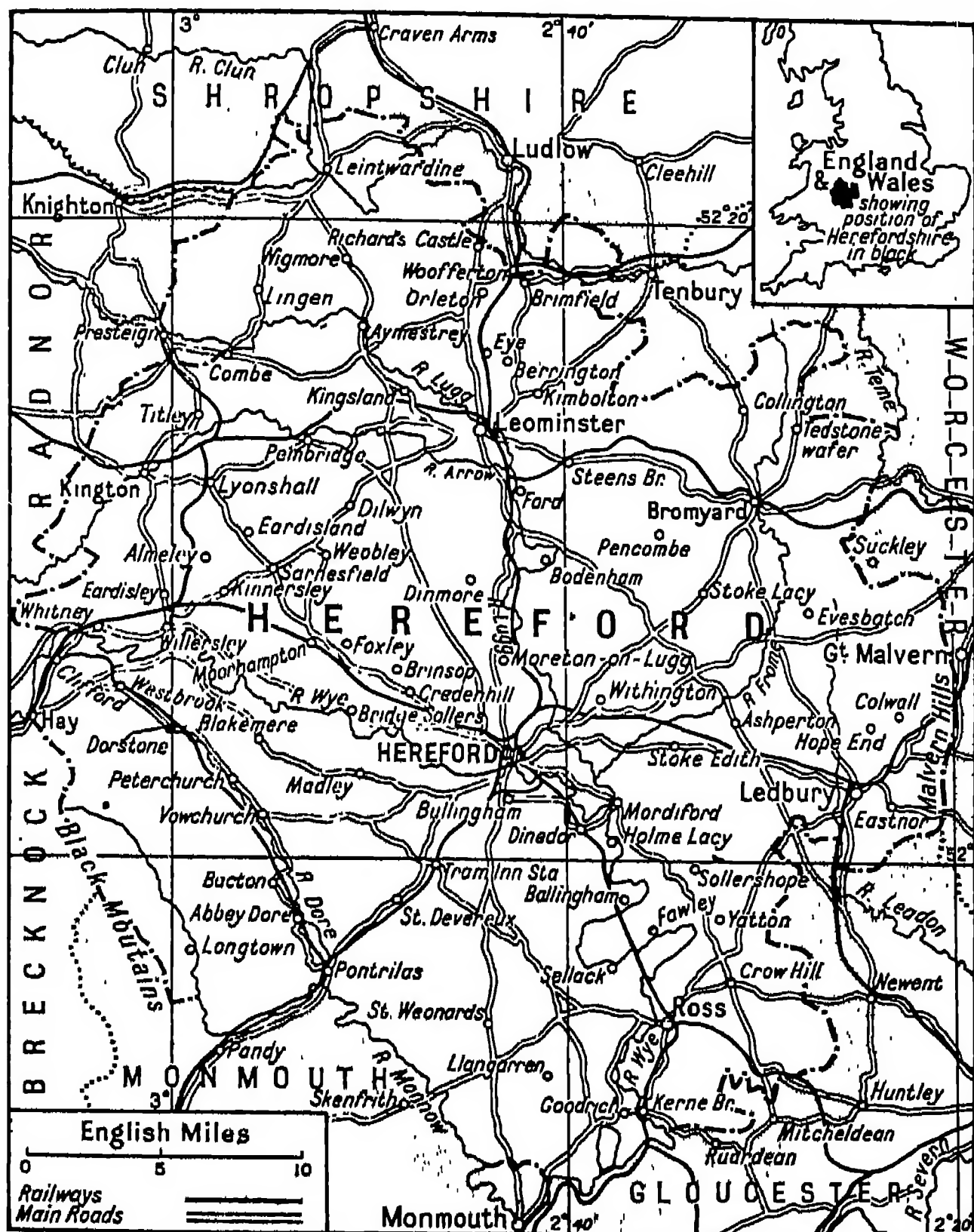


Herefordshire Regiment badge

George VI was colonel-in-chief. In the First Great War it served in Gallipoli, Palestine, and France. In the Second Great War it formed part of the 53rd (Welsh) Territorial division. Landing in Normandy in June, 1944, it saw hard fighting at Caen, Falaise, the Ardennes, the Reichswald, at the crossing of the Rhine, and during the sweep across Germany.

Herero OR OVAHERERO. Negroid people in the S.W. Africa Protectorate. Situate S. of the allied agricultural Ovambo, they were formerly called Cattle Damaras, to distinguish them from the more primitive Hottentot-speaking Hill Damaras. Muscular, aggressive, skin-clad, they were the only purely pastoral Bantu-speaking people extant until they adopted some agriculture under missionary direction. They petitioned Sir Henry Barkly in 1872 for a British protectorate, but in 1884 their country was annexed by Germany.

In 1881, after a period of mutual tolerance, they waged ruthless warfare against the Hottentots; in 1903-06 they rebelled against the German colonial forces, at whose hands large numbers perished. The remainder, estimated



Herefordshire. Map of this western English border county, famous for its agriculture and orchards, showing the course of the river Wye

district became more peaceable, fine churches and houses were built. Holme Lacy is perhaps the finest seat in the county. There was a monastery at Abbey Dore.

Good fishing is to be had. The pop. in 1951 was 127,150, making the county one of the least densely peopled parts of England.

LITERARY ASSOCIATIONS. Richard Whittington, Lord Mayor of London, is supposed to have been born at Sollers Hope in the mid-14th century. Richard Hakluyt,

Kemble, was born at Ross. Sir Uvedale Price, writer on the picturesque, lived and died at Foxley in the parish of Yazor. Brinsop, the home of his wife's people, has a memorial window to Wordsworth. Elizabeth Browning passed much of her early life at Hope End, near Ledbury; in 1894 a clock tower was erected in the town to her memory. John Masefield was born at Ledbury.

The Victoria History of the co., ed. W. Page, appeared in 1908;



Herero. Warriors of this South-West African people

(1913) at 21,600, as compared with some 85,000 before the German occupation, were deprived of their cattle and gathered into reservations. Hereros today live in eight reserves, each having its chief, under the direction of a European commissioner. *See Africa.*

Hereroland. Country forming a portion of the S.W. Africa Protectorate, also called Damara-land or Damaland. It lies between Namaqualand on the S. and Ovamboland on the N. The coastal region is waterless desert; behind this area is a mountainous district with peaks 8,500 ft. high, and beyond this there is good pastoral and agricultural country, extending towards the Kalahari Desert. The chief towns in Hereroland are Windhoek, Karibib, Rehoboth, Gobabis, Omaruru, and the port of Swakopmund. The only harbour is Walvis Bay, S. of Swakopmund.

Heresy (Gr. *haireisis*, choice). An opinion based on the choice of its holder and not on recognized authority. The word appears to have been first used in this sense at Alexandria, to denote the theological views of certain Jews, Pharisees, Sadducees, and Essenes. In the early Christian Church it came to mean an erroneous doctrine held by a body of people, but differing from that of the Church generally. Heresy differs entirely from unbelief or even scepticism. It believes and upholds Christian doctrine, but it misunderstands and misinterprets it. Similarly, it is not identical with schism, for a schismatic may be quite orthodox in his belief, while separating himself from the household of faith on some question of discipline.

Heresy is difficult to define, since it presupposes orthodoxy, which is a declaration of a point of view. A teacher who is orthodox from the Anglican standpoint may be an utter heretic from the R.C., and vice versa. A person merely mistaken in his views is not necessarily a heretic; the latter term implies a deliberate rejection of the orthodox belief. Only one who persists in his error after warning and instruction is to be regarded as a heretic, according to the N.T. rule, "A man that is an heretic after the first and second admonition reject" (Tit. 3, v. 10). The old canon law provides that only an error persistently maintained is to be counted heresy. The law of England declares to be heresy that which has been so determined heretofore by the authority of the Canonical Scriptures, or the four first general councils, or any of

them, or by any other general council, wherein the same was declared heresy by the express and plain words of the said Canonical Scriptures; or such as shall hereafter be determined to be heresy by the high court of parliament of this realm, with the assent of the clergy in their convocation.

Formerly in England bishops were required to punish heretics, and to notify to the lord high chancellor the preachers of heretical doctrine. In 1400 the statute *De Haeretico comburendo* was passed, and remained in force until it was partly repealed by Henry VIII, and finally abolished by Charles II. The last writs under this Act were issued in the ninth year of James I, when two preachers were burnt for heretical teaching. Ecclesiastical penalties for heresy now in force in Great Britain are deposition from office and excommunication in case of persistent obstinacy. The bishop of each diocese has the power to try charges of heresy brought against his clergy, and to punish them if found guilty.

It is remarkable that almost all the heretical movements in the Church can be traced back to a common origin in the Gnosticism which made its appearance in the days of the Apostles, and was denounced by them in their Epistles. Manichaeism, Arianism, Pelagianism, Montanism, Sabellianism, and the rest, are all either reflections of some aspect of Gnosticism or revulsions from it. *See Christianity; Dogma; Gnostics; Lollards.*

Hereward. An English hero, called the Wake. He held land in Lincolnshire, just before the time of William the Conqueror, and soon after the conquest became associated with those who disliked the Norman rule. He took part in an attack on Peterborough, and was the leader of those who resisted the king in the Isle of Ely. The story says he escaped when William made his way into the isle, in 1071, but nothing more is known of him. He is the hero of a romance by Kingsley, first published 1866.

Herford. Town of Germany, in Westphalia. It stands at the junction of the Werre and the Aa, 16 m. S.W. of Minden. It is a rly. junction, and has some interesting churches, one dating from the 12th cent. and two from the 13th. A Benedictine nunnery was founded in the 9th century, around which the town grew. The house before its end in 1803 was one of the richest in Germany. Herford was once a free city, but became part

of Brandenburg in 1647. It passed to Prussia in 1815. Pop. 35,040.

Hergenröther, JOSEPH VON (1824-90). German theologian and historian. He was born at Würzburg, Sept. 15, 1824, and educated at Rome and at Munich, where he became professor of church history in 1855. In his anti-Janus (Eng. trans. 1870), a reply to Döllinger's Janus, he upheld the infallibility of the pope. In 1868 he undertook the arrangements of the Vatican Council, and in 1870 was raised to the cardinalate, and was appointed curator of the Vatican archives. His works included a history of the papal states after the Revolution.

Hergesheimer, JOSEPH (1880-1954). American novelist. Born at Philadelphia, Feb. 15, 1880, and



J. Hergesheimer,
American novelist

educated at the academy of fine arts there, he published his first book, *The Lay Anthony*, in 1914. His novels, notable for powerful characterization and subtly observed details, became as popular in Great Britain as in the U.S.A. They included *The Three Black Pennys*, 1917; *Java Head*, 1919; *Linda Condon*, 1919; *The Bright Shawl*, 1922; *Tampico*, 1926; *The Party Dress*, 1929; *Tropical Winter*, 1933; *The Foolscap Rose*, 1934. *The Presbyterian Child*, 1924, was autobiography; *From an Old House*, 1925, described his home at Westchester. Hergesheimer died April 25, 1954.

Hergest, THE RED BOOK OF. A 14th century MS. in the library of Jesus College, Oxford, containing many old Welsh tales and poems. Its contents include a brief chronology from Adam to 1318, and a chronological history of the Saxons to 1376, also many of the poems ascribed to Taliesin (*see Mabinogion; Taliesin*). An exact copy was published by Rhys and Evans in 1887.

Heriot (A.S. *here*, army; *geatu*, apparel, equipment). The arms of a vassal which on his death were returned to his lord. Later it became customary to pay something in kind or in money in lieu of handing over the weapons, and this relief was sometimes called a heriot. Similarly it became the custom, where the manorial system prevailed, for the lord to take on death a beast or some other

portion of the property of a tenant, which was also called a heriot. See Feudalism; Relief.

Heriot, GEORGE (1563-1624). Founder of Heriot's Hospital, Edinburgh, Scotland. A goldsmith



George Heriot,
Scottish philanthropist

From an old print

by trade, he was appointed goldsmith for life to Queen Anne, wife of James VI, in 1597, and jeweller to the king in 1601. After James's accession to the throne of England he settled in London in 1603, and in 1609 took as his second wife a daughter of James Primrose, grandfather of the first earl of Rosebery. He left the residue of his property to found the hospital which bears his name. He died Feb. 12, 1624.

Heriot's Hospital. Formerly a charitable institution founded in Edinburgh by George Heriot, jeweller to James VI. A combination of Roman and Gothic architecture, erected 1628-59, 162 ft. square with an inner quadrangle 92 ft. square, it is said to have been designed by Inigo Jones. Of its 213 windows, only two are of one pattern. Cromwell used it as a barracks, but it reverted to its original use when Charles II ascended the throne. Extensively renovated in 1828, it is now a day school, managed by the Heriot Trust, which, from the funds derived from the investment of Heriot's bequest of £23,625 (now

of arts. It now has over 3,500 day and evening students in engineering, chemistry, building, printing, etc. An independent body of governors took office in 1928. Extensions were completed in 1935 and 1938. Named after Watt, inventor of the steam engine, to whom there is a statue in the front, it is supported partly by funds granted by the Heriot Trust.

Heri Rud. Alternative spelling of Hari Rud (*q.v.*), Anglicised name of an Afghan river.

Herisau. Town of Switzerland, the largest in the canton of Appenzell, Outer Rhodes. It is 6 m. by rly. S.W. of St. Gall, and is a station on the Bodensee-Toggenburg rly. It stands on the Glatt torrent, at an alt. of 2,549 ft. There are thriving manufactures of machinery, cotton, and muslin, and an old (partly 11th-century) church. In the vicinity are the goats' whey cure and chalybeate spring of Heinrichsbach. Herisau was governed by the abbots of St. Gall from the 9th to the 15th century, when the canton joined the Swiss Confederation. Pop. (1950) 13,464.

Heritable and Movable. Term used in Scots law to distinguish the part of a property which descends to the heir, the heritable property, and the part which goes to the next-of-kin, the movable property. As examples of the first may be cited land, leases, certain fixtures, etc., and of the second, household furniture, money, etc. Such a distinction applies not only in problems of succession but



Heriot-Watt College, Edinburgh. Technical college and school of arts erected in 1887

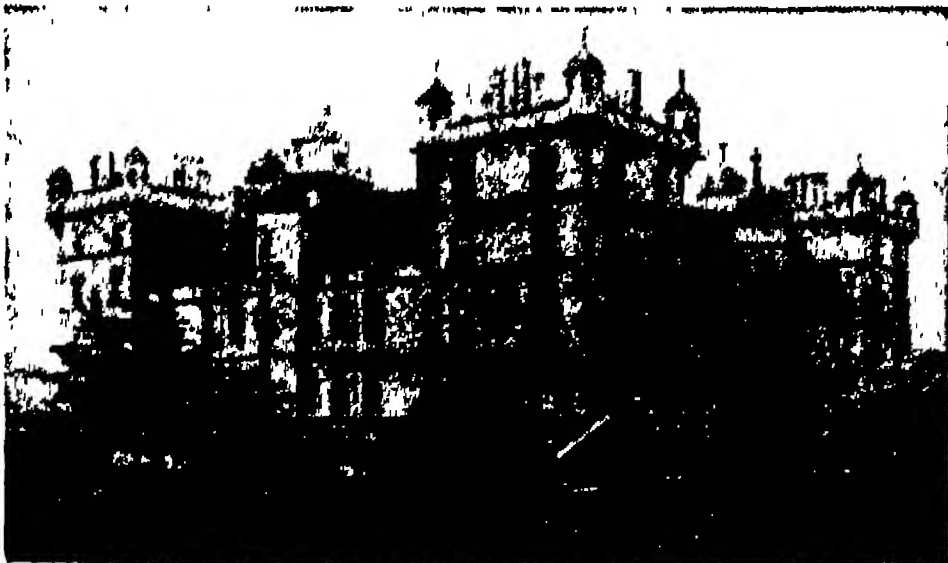
Caird Inglis

Heritable Jurisdiction. Obsolete class of Scottish jurisdiction which granted certain families power to administer laws irrespective of the common law. These jurisdictions, of which nearly a hundred were in existence at one time, empowered their holders to punish by fines, imprisonment, or even death those who came within their province. Such arbitrary powers, exercised mainly by great Scottish chiefs, were a source of danger to the state, and were abolished 1748, properly constituted sheriffs being appointed in their place, and pecuniary compensation for the loss of these rights being paid to the amount of over £150,000. See Clan.

Heritable Security. In Scots law, name given to those securities corresponding to mortgages and charges on land in England. Under these securities a creditor is enabled, for example, to receive rents until the debt is discharged, no matter into whose possession the lands may pass. The principal heritable security is called the bond and disposition in security, and must be recorded in the register of sasines. When two securities compete, the one first registered takes precedence.

Heritor. Term used in Scots law for the owner in fee of heritable property in a parish. Until 1925 the parish church was vested in the heritors, who were bound to repair it. Then all church property was transferred to the Church of Scotland general trustees.

Herkomer, SIR HUBERT VON (1849-1914). British painter. He was born at Waal, Bavaria, May 26, 1849, the son of a wood carver. In 1857 the family settled in England. In 1869 Herkomer became an exhibitor at the Dudley Gallery, and a contributor of sketches to



Heriot's Hospital, Edinburgh, from the south-west

greatly enhanced in value), contributes an annual payment also towards the Heriot-Watt College (*v.i.*) and has founded bursaries for government-aided schools in the city. Near the hospital is a fragment of the old city wall.

Heriot-Watt College. Technical college in Edinburgh, originally founded in 1821 as the school

between landlord and tenant, husband and wife, etc. Machinery that has been installed and fixed to the floor may be heritable. The ease with which such objects may be moved without damage to a building, and the reason for their addition to the building, determines the class into which they fall. See Fixture.

The Graphio. He was elected A.R.A. in 1879, R.A. in 1890. In 1883 he founded a school of art at Bushey, Herts; he was Slade professor at Oxford 1885-94.

Among his works, which included many large sentimental "subject" pictures, are *Found*, 1885, in the Tate Gallery; *Lady in White* (portrait of Miss Grant), 1885; *A Zither Evening with my Students*, 1901; and a gigantic group of the town council of Waal. For many years his pronouncements on art topics, forceful rather than profound, were widely quoted. He was knighted in 1907, and died at Bushey, March 31, 1914.

Herm. One of the Channel Islands. It is 3 m.E. of Guernsey, and is $1\frac{1}{2}$ m. long by $\frac{1}{2}$ m. broad. It is noted for the extraordinary variety of shells on its beach. Before the First Great War the island was leased to a German company, but after being regained by the British it was sold to an English one, and later to the British government. In 1946 Guernsey purchased Herm from Great Britain for £15,000. There are frequent excursions from Guernsey in the summer. Pop. (1951) 36.

Hermæ. Small pillars, surmounted by a head, generally of Hermes. They were set up in large numbers in public places in the towns of ancient Greece. It was the alleged mutilation of the Hermæ of Athens perpetrated during a drunken frolic on the eve of the Athenian expedition to Sicily in 415 B.C., that led to the disgrace of Alcibiades.



Hermæ. The Hermæ of Alcmanes

Her Majesty's Theatre. London theatre, in the Haymarket. In the first building erected on the site, opened as the Queen's Opera House in 1705, the first performance of Handel's *Rinaldo* took place in 1711. The building having been burnt down, a new one was erected in 1791, and named the King's Theatre. Here Don Giovanni was produced for the first time in England in 1817. On the accession of Victoria the name of Her Majesty's Theatre was given to the building, which regained

popularity in 1847 with the début of Jenny Lind. The days of Tietjens, Trebelli, and Nilsson followed, 1862-67, when the theatre was again burnt to the ground. Rebuilt, it stood empty till Moody and Sankey filled it with their revivalist services.

The theatre designed in 1897 for Beerbohm Tree, and long associated with him, he built out of the profits of *Trilby*. Called His Majesty's Theatre 1901-52, it formed part of a site bought by the New Zealand govt. in 1949 for development as the high commissioner's offices; the theatre could not be touched until 1970.

Hermanaric or **ERMANARIO.** A king of the Ostrogoths. He founded a vast empire, said to have extended from the Don to the Theiss (Tisza) and from the Danube to the Baltic. Attacked by the Huns under Valamir, A.D. 375, Hermanaric, fearing defeat, threw himself upon his sword. According to another story, he ordered Swanhildr, his son's wife, to be torn to pieces by wild horses. Her brothers cut off Hermanaric's hands and feet and left him to die.

Hermandad (Span., brotherhood). Name given to various confederations of Spanish cities. Formed in the 13th century, partly for maintaining law and order, and partly as a check upon the growing and autocratic power of the great nobles. The confederation provided protection to travellers by suitable police, brought criminals to justice, and in every way acted as the embodiment of the law. The hermandads became for a few years in the 15th century all powerful in Spain, every city becoming a member of one confederation covering all Spain. In the following century their power declined rapidly, and eventually they became extinct. Most powerful was the Santa Hermandad, or Holy Brotherhood, of the 14th and 15th centuries.

Hermaphrodite. A biological term for an organism in which the two sexes are combined. Some low species of animals, such as snails and earthworms, and many plants, are normally hermaphrodite, possessing both male and female generative organs, which produce sperms and ova. But these do not necessarily, or even usually, fertilise each other, cross-fertilisation being ensured by the fact that the sperms and the ova in the same individual ripen at different periods.

No instance is known in human beings of true hermaphroditism,

i.e. of a human being having both male and female organs present, and both functionally active; but the term is used in medicine of persons having glands corresponding to both the testes of the male and the ovaries of the female in one individual; also to the more common instances in which the sex of the individual is doubtful. The explanation of this more common form is to be found in the development of the external genital organs, hermaphrodites usually being individuals in whom a part has persisted which ought to have disappeared in the process of development. Rarely there occurs an individual with ovaries, and therefore a female, in whom the external appearances are those of a male; and conversely.

Hermaphroditus. In Greek mythology, son of Hermes and Aphrodite. The nymph of a fountain by Halicarnassus fell in love with the youth, and the two combined to form a being with the characteristics of both sexes.

Hermas. An early Christian writer. Supposed to have been a brother of Pope Pius I, he appears to have flourished in the first half of the 2nd century, when he wrote an allegorical work giving a valuable picture of the state of Christianity at Rome during the period. The object of the book was to check worldliness. It was at one time read in churches, but was set apart from the canonical Scriptures before the 4th century.

Hermeneutics (Gr. *hermeneutikē*, interpretation). The art or science of interpretation. It deals with the principles and general laws whereby the meaning of the written work of an author or the speech of an orator is established. The term is specially applied to the interpretation of the books of the Old and New Testament, as contrasted with *exegesis* (q.v.), commentary or practical exposition of the subject matter.

Hermes. In Greek mythology, son of Zeus. He was born on Mt. Cyllên in Arcadia, and on the very day he was born stole some oxen belonging to Apollo. He became an adept in robbery, stealing the trident of Poseidon, the girdle of Aphrodite, and the sword of Ares. These exploits apparently recommended him to Zeus, who took him to be his messenger and ambassador. In this capacity he executed many notable commissions, such as slaying the hundred-eyed Argus and carrying the infant Bacchus to the nymphs at Nysa. Hermes became the god of

eloquence and the god of good fortune, and was recognised also as the patron of merchants, and travelers, and of thieves. One of his chief duties was to conduct the souls of the dead to the nether world. The invention of the lyre was attributed to Hermes. In art Hermes is represented as a handsome and finely proportioned youth, as in the famous statue by Praxiteles. Traditionally he wears the *petasus* or broad-brimmed hat, bears the *caduceus* or staff, which he got from Apollo in exchange for the lyre he invented, and has the winged sandals which enabled him to speed swiftly through the air. The Romans identified Hermes with Mercury (*q.v.*).

Hermes. First British vessel completed as an aircraft carrier. Laid down as a cruiser, 1918, she was completed as a carrier 1923. Displacing 10,850 tons on a length of 598 ft. and maximum beam of 90 ft., she had a maximum speed of 25 knots, and mounted a main armament of six 5.5-in. dual-purpose guns and a secondary battery of 18 A.A. guns. She was manned by a crew of 664 and accommodated 15 aircraft. In the Second Great War, after service in the Mediterranean and the Indian Ocean, the *Hermes* was sunk 10 m. off Ceylon by Japanese dive-bombers, April, 1942.

Hermesianax. Greek elegiac poet. A native of Colophon in Asia Minor, he flourished during the reign of Alexander the Great. One of the chief representatives of the Alexandrian school, he was the author of three books of elegiacs, named *Leontion* after his mistress, containing some pretty love stories, mythological and historical. They show considerable facility of invention, but the language is frequently artificial and affected.

Hermetic Books. Writings attributed to Hermes Trismegistus (*Hermes thrice-greatest*) the name by which the Egyptian god Thoth was known to the Greeks. He was considered the inventor of all the arts and sciences, especially the occult. The hermetic books, according to Clement of Alexandria 42 in number, were of a philosophical or scientific character, most of them probably the work of Alexandrian Platonists in the 2nd century A.D.

There is a complete translation of the extant works and fragments by L. Ménard, 1866, and of the *Poimander* by J. D. Chambers, 1882. Trismegistus was supposed to possess great skill in shutting up vessels with a magic seal, hence

the modern expression, "hermetically sealed" applied to closing a vessel or tube in such a manner that it is airtight.

Hermione. Ancient city of Greece, in the prov. of Argolis and Corinthia. Standing on the mainland N.W. of Hydrea, it was a prominent port with a double harbour, but the only remains extant are the scanty ruins of its temple of Poseidon. Founded by the Dryopes, it figured for a time as an independent state, but became subject to Argos. *Pron.* Her-mī-onee.

Hermit or EREMIT (Greek *erēmos*, solitary). Term applied to those who live in monastic communities, but especially to one living a solitary life in a cave or hut of his own construction, who has abandoned the world and its



The Hermitage, Leningrad. South entrance of Russia's leading museum and picture gallery

ways, and practises the severest austerities. Paul of Thebes, according to tradition the first hermit, is said to have fled to the desert during the persecution of Decius and to have lived in a grotto for 90 years. Anthony, Hilarion, Arsenius, and Simeon Stylites are among other famous hermits of history or legend. *See* Anchorite; Asceticism; Laura; Monasticism.

Hermit. Small group of islands in the western portion of the former German territory known as the Bismarck Archipelago, in the Pacific. They lie off the E. coast of New Guinea. A British naval force annexed the islands in Nov., 1914. *See* Bismarck Archipelago.

Hermitage. Retreat, cell, or habitation of a hermit or recluse. In modern usage the name is often applied to buildings that have nothing in common with the original meaning, *e.g.* to a palace of Catherine II in Leningrad; to a fashionable garden resort in Moscow; and to a palace near Baireuth, Bavaria, once occupied by Frederick the Great. There was a Hermitage, in the old sense of the

term, at Warkworth, Northumberland, one on St. Herbert's Island, Derwentwater, and a retreat of S. Francis, near the convent of S. Francisco, Assisi, Italy. A 13th century stronghold near Castleton, on the Scottish border, was known as the Hermitage.

Hermitage, THE. Largest art museum in the U.S.S.R., ranking as one of the foremost museums in the world. It originated as the private collection of Catherine II towards the end of the 18th century. The buildings of the Hermitage, erected in the 1760's, by the French architect Vallin de la Mothe, adjoin the Winter Palace in Leningrad. An early catalogue enumerates some 2,500 paintings, and the collection also comprised engravings, ancient sculpture, jewels, coins, and medals; *objets d'art* in porcelain and gems forming the basis of a collection of applied art.

The Hermitage, still a private court collection, expanded mainly by purchases of pictures, and began to take on the aspect of a museum. New buildings were

raised 1839-50 by the German architect Klentze. The museum was opened to the public in 1852. In 1884 a department of medieval and renaissance art was started. At the Revolution most of the exhibits were temporarily removed to Moscow. Private collections nationalised thereafter were also added to the museum; in 1923 the Stieglitz museum of applied art was incorporated.

The department of Western European Art is rich in examples of 16th and 17th century Italian painting, 17th century Spanish, Flemish, and Dutch, and 17th and 18th century French masters. The collection of drawings amounts to some 20,000; of engravings, to about 250,000. There are collections of porcelain; 18th century English and French silver; snuff-boxes; 16th century Italian majolica; Moorish faience; 16th century French enamels; 11th to 16th century ecclesiastical art. The department of antiques, besides having a fine collection of Roman portrait busts, vases, and terra-cotta, is notable for a unique

collection of Scythian relics and Greek jewellery. The collection of coins and medals (some 300,000) is one of the finest in the world. The Eastern section has Sassanid silver, Persian and Caucasian bronzes, ceramics, and carpets.

Hermitage. French wine grown near Valence, in the Drôme. Red Hermitage resembles Beaune in colour and strength, and claret in elegance; the white, of which little is made, is similar but superior to Chablis. Beaujolais, often classed with Hermitage, is grown on the northern hills of the Rhône dept.

Hermit Crab (*Pagurus* and *Eupagurus*). Popular name for a group of small crabs which take up their abode in the empty shells of whelks and other gastropods or in living sponges. This habit is due to the fact that the hinder half of the body is not protected by a



Hermit Crab. Specimen of *Pagurus Bernhardus*

hard carapace and needs shelter against its enemies. The abdomen is provided with a pair of grasping appendages by which the crab clings tightly to the shell, from which it is not easily extracted. Eleven species are found around the British coasts. See Crab.

Hermogenes of TARSUS (2nd century A.D.). Greek rhetorician. He taught in the reign of Marcus Aurelius at Rome, where he was considered a youthful prodigy. He was the author of four extant rhetorical treatises, on disputed points of law, invention of arguments, different styles, best uses of material, and of some rhetorical exercises. *Pron.* Her-moj-eneez.

Hermon. Mt. of Syria. It forms the S. extremity of the Anti-Lebanon range; its Arabic name is the Jebel esh Sheikh. Often mentioned in the Bible, it is 9,150 ft. high, and on its slopes are the ruins of a great temple of Baal. Little Mt. Hermon range lies about 24 m. S.E. of Acre.



Hermon, the mountain at the southern extremity of the Anti-Lebanon range, Syria

Hermonthis. Greek name of a city of ancient Egypt, the present Armant, 9 m. S.W. of Luxor. Here are the remains of temples of Month, god of war, and of Isis, and the burial place of sacred bulls. Its Egyptian name was On or Permentu (House of Month).

Hermopolis. Greek name of the ancient Egyptian city of Khmunu, the modern Eshmunein. About 176 m. S. of Cairo, Hermopolis was the chief centre of the worship of Thoth, the god of writing and science. Catacombs containing mummies of the ibis and the baboon, creatures sacred to him, have been found here. Important papyri have been found in the vicinity.

Hermopolis (Greek Hermoupolis, city of Hermes). Seaport of Greece, capital of the barren island of Syros (Syra) and the dept. of the Cyclades. Situated on the E. shore of the island, in a sheltered bay, it consists of an old and a modern well-built town, and is an administrative centre. It has a good harbour, an arsenal, high school, seminary, theatre, etc. The

seat of a Greek and an R.C. bishop, it has a shipbuilding industry, and manufactures "Turkish delight," cottons, leather, flour, and glass. The exports include emery, valonia (acorn cups containing a high percentage of tannin), sponges, and tobacco. Pop. 21,150.

Hermosa (Sp., beautiful). Pass or mule track over the Andes between San Juan in Argentina and the Chilean town of Ovalle in Coquimbo.

Hermosillo. City of Mexico, capital of the state of Sonora. It stands on the river Sonora, 89 m. by rly. N. of Guaymas, and is a busy trade centre, particularly

with the U.S.A. Silver and copper are mined; bullion, hides, ores, and fruits are exported, the orange groves supplying the U.S.A. before its own fruit ripens. Sugar is grown, and flour milling and distilling are carried on. The city contains a cathedral, a mint, and a library. Pop. 30,000.

Hernani, ou L'HONNEUR CASTELLAN (Castilian honour). Five-act tragedy in verse by Victor Hugo. It was produced at the Comédie Française, Paris, Feb. 25, 1830, and ran until June 18. It was a departure from traditional literary form, liberated the French stage from the thralldom of the classical unities associated with the school of Racine, marked the beginning of the romantic movement of 1830-50, and provoked at the outset extraordinary opposition which resulted in at least one fatal duel.

It is notable for the vigour of its verse, the effectiveness of its stage situations, and the long soliloquy of Charles V before the tomb of Charlemagne. The titular hero is a mysterious bandit who at the moment of his marriage dies by his own hand in order to keep his word to his enemy. Upon Hugo's work Verdi founded his opera *Ernani*, produced at Venice, 1844; when given in Paris, 1846, it was named *Il Proscritto*. Fechter and Edwin Booth acted in an English adaptation, and this, like Verdi's opera, was in four acts. Sarah Bernhardt made one of her many successes in the rôle of the heroine Dofia Sol. See Hugo, V.

Hernani. Town of Spain, in the Basque prov. of Guipuzcoa. It stands on the river Urumes, 8 m. S.E. of San Sebastian. The chief features are several palaces and a church celebrated for its wood carvings. Hernani suffered much in the Carlist wars of the 19th century. It makes cider; and many of its people work in iron mines near by. Pop. (1950) 8,577.

Herne Bay. Urban district and holiday resort of Kent, England. It is 12 m. W. of Margate and 62 m. by railway from London. Visited in summer for its sands and bracing air, its attractions include 7 m. of sea front; one of the longest pleasure piers in the U.K., with pavilion, concert party, sports, etc.; theatre, bandstand, and facilities for dancing. In the district is Reculver (q.v.) with Roman remains, site of the Roman station of Regulbium, and 1½ m. inland is the village of Herne, with the E.E. church of S. Martin. Pop. (1951) 18,298.



Herne Bay, Kent. The sea front looking east towards the Clock Tower

Frith

Herne Hill. Residential dist. of London, S.E. It lies between Brixton on the W. and Dulwich on the E., and has a station on the electric rly. It is in the boroughs of Camberwell and Lambeth. At No. 28 and No. 30, Herne Hill, the road leading N. from the rly. station to join Denmark Hill, lived Ruskin; both houses have been replaced by flats. Between Burbage Road and Dulwich are Herne Hill athletic grounds. The name Herne Hill is believed to be derived from Heron Hill.

Herne the Hunter. Horned apparition which was supposed to haunt a certain oak in Windsor Forest in the time of Elizabeth. The legend is used to Falstaff's undoing in *The Merry Wives of Windsor*, and forms a notable feature in Harrison Ainsworth's romance *Windsor Castle*. Herne's Oak, said to have been six hundred years old, was blown down, Aug. 31, 1863. A young oak was planted on the spot by Queen Victoria, Sept. 12. Consult *Windsor, the Castle of our Kings*, A. Goddard, 1911.

Hernia or RUPTURE. Latin name given to the protrusion of an organ or part of an organ through an opening in the cavity which normally contains it. After an injury to the head, for example, the brain may protrude through the scalp, forming a hernia of the brain. The term, however, is commonly applied to the protrusion of organs in the abdominal cavity through weakened spots in the abdominal wall.

Congenital defects or weakness of the abdominal wall are frequent predisposing causes. The actual rupture, which occurs later, may be due to frequent strain upon the wall, resulting from occupations entailing lifting heavy weights; weakening of the abdominal wall, such as may follow childbirth; direct injury to the wall; or weakness in the neighbourhood of a scar following an abdominal operation.

A hernia consists of a sac formed by the peritoneum or lining membrane which covers the abdominal organs, and of the contents of the sac, most frequently a part of the intestine. The abdominal wall is pushed in front of the protruding mass, and the sac becomes adherent to the surrounding parts.

In inguinal hernia part of the abdominal contents, usually a portion of the intestine or membranous covering of the intestine, has passed through the inguinal canal, a narrow channel towards the inner end of the groin, beneath the skin, through which the spermatic cord and blood-vessels pass down to the testicle. In the early stages, a slight swelling only can be felt in the region of the inguinal canal, which enlarges when the patient coughs. In the later stages, the swelling is larger, and may eventually extend into the scrotum.

A reducible hernia is one in which the protruded mass may be replaced in the abdominal cavity by gentle manipulation. A femoral hernia is less common, in which the protrusion passes through the crural canal, and appears as a rounded swelling on the inner side of the thigh near its junction with the abdomen. An umbilical hernia consists of the protrusion of the abdominal contents through a weakened scar of the umbilicus or navel. Ventral hernia is a protrusion through some other spot in the abdominal wall.

The treatment is either palliative or radical, i.e. by operation. Palliative treatment consists in wearing a truss, i.e. an appliance consisting of a pad which presses upon and closes the aperture in the abdominal wall, and is kept in position by a spring belt passing round the body. A truss should be well fitted, and the contents of the hernia should never be allowed to come down. In some cases, this treatment may effect a permanent cure after the truss has been worn for a year or two.

The operative treatment consists essentially in sewing together the tissues which form the abdominal wall, so as to reduce or close the aperture through which the hernia is protruded.

A hernia may become inflamed, obstructed, or strangulated. The symptoms of an inflamed hernia

are pain, tenderness, and swelling, while the skin over the hernia may be hot and congested. Fever may be present, but the constitutional symptoms are not so severe as in strangulation.

In an obstructed hernia, the onward passage of material through the intestine is prevented. The symptoms are usually constipation, nausea, and vomiting. The hernia becomes irreducible and may pass on to strangulation. In a strangulated hernia, the blood-vessels become pressed upon, so that the flow of blood through them is obstructed. This may lead to gangrene of the mass. The symptoms are severe pain, with signs of shock. The patient feels faint, the pulse is slow and weak, the temperature may be subnormal, and the skin covered with cold sweat. Strangulation urgently demands surgical treatment. See Truss.

Hernici. People of ancient Italy akin to the Sabines, living in the Apennine country. Continual warfare was waged between them and the Romans, by whom they were finally subjugated in 306 B.C. Their chief stronghold was Anagnia. See Anagni.

Hernosand. Seaport of Sweden, capital of the län or govt. of Västernorrland. It stands on Hernö island, in the estuary of the Ängerman river, and is connected by bridges with the mainland, 423 m. by rly. N. of Stockholm. It has a good harbour, a cathedral, a school of navigation, and a technical school. It was the first European town to adopt electric lighting. Formerly a staple town, it has trade in linen, sulphite, fish, iron ore, and lumber. An old city, it has suffered severely at the hands of the Russians, notably in 1710, 1714, and 1721. Pop. 13,316.

Hero. General term applied to one who performed great deeds in the mythical ages of Greece. One or other of the parents of heroes was frequently a god or goddess, and sometimes after their death heroes became gods themselves. Among the best known heroes of Greek mythology are Hercules, who accomplished the famous Twelve Labours; Theseus, who slew the Minotaur; Perseus, who cut off the Gorgon's head and rescued Andromeda from the sea-monster; and Achilles and Hector, the champions of the Greeks and Trojans respectively at the siege of Troy. The name was also given to the oekists, founder of colonies or cities, who received semi-divine honours after death, and to famous personages such as Leonidas, the hero of Thermopylae.

Hero. In Greek legend, priestess of Aphrodite at Sestos, on the shore of the Hellespont opposite Abydos. *See* Leander.

Hero of Alexandria (fl. c. 100 B.C.). Alexandrian mathematician. His exact date is unknown, but his reputation has survived for several memorable discoveries in mathematics and science. His most remarkable discovery was that of the well-known formula for the area of a triangle in terms of its sides and the semi-perimeter. It is also certain that he knew elementary trigonometry and the solution of quadratic equations in algebra.

Hero was responsible for a number of mechanical inventions, the chief of which is the fountain that bears his name. This was an automatic fountain working by means of air pressure. He is also credited with the description of a small stationary steam-engine. The fragments that remain of his works place him as being the leading scientist of his age.

Herod (74-4 B.C.). King of Judaea, called the Great. The son of Antipater and grandson of Antipas, governor of Idumaea, he was appointed ruler of Galilee at the age of 25, and afterwards of Coele-syria. When Palestine was invaded by the Parthians to restore Antigonus to the throne of his father Aristobulus, Herod escaped to Rome, where Antony and Octavian, with the sanction of the senate, made him king of Judaea. He returned to Palestine in 39 B.C. and captured Jerusalem in 37, in which year he married Mariamne, the Asmonean princess, as his second wife. His first difficulties were with the hostile Sadducean and Pharisaic parties, and throughout his reign (37-4) he was opposed by the enmity of his wife's family. After the battle of Actium (31) Herod was confirmed in his position and territory by Octavian, whom he visited at Rhodes, expecting to be executed owing to the help he gave Antony. From that time on he governed Palestine on behalf of Rome.

Herod built fortresses, established new towns, rebuilt the temple at Jerusalem, organized games, and encouraged Greek writers and teachers to settle in his kingdom. His brother Pheroras and his sister Salômê plotted against his sons by Mariamne, which led Herod to have them assassinated. Mariamne he had put to death owing to jealousy. His last years were embittered by family feuds and plots arising out of the enthusiasm of the people for the Asmonean house. His eldest son, Antipater, he had put to death ten days

before his own death. The story of his massacre of the innocents is generally discredited nowadays. The picture of Herod as an inhuman monster, as given by Josephus, is also open to serious criticism.

Bibliography. *Life and Times of Herod the Great*, W. Willett, 1880; *Antiquities of the Jews*, F. Josephus, rev. ed. D. S. Margoliouth, 1906; *The Jewish People in the Time of Jesus Christ*, E. Schürer, Eng. trans. 1890; *The History of Herod*, J. Vickers, rev. ed. 1901; *Herod*, J. S. Minkin, 1938.

Herod. Tragedy written by Stephen Phillips and produced Oct. 31, 1900, at Her Majesty's. The play deals with the murder of Mariamne's brother Aristobulus by order of Herod, with the successful plot formed by Herod's mother and sister to bring about the execution of Mariamne, and with Herod's unavailing grief and remorse for her death. Beerbohm Tree played Herod, and Maud Jeffries Mariamne.

Herod Agrippa I (d. A.D. 44). Son of Aristobulus and Berenice and grandson of Herod the Great. He was made king by Caligula and governor of Judaea and Samaria by Claudius. *See* Agrippa.

Herod Agrippa II (d. A.D. 100). Son of Herod Agrippa I. He was the last of the Herodians (q.v.). Paul appeared before him in A.D. 60. *See* Agrippa.

Herod Antipas. Son of Herod the Great by Malthace, a Samaritan. By his father's will he was made tetrarch or governor of Galilee and Peræa. He built for his capital a city on the Sea of Galilee which, to ingratiate him-

self with the Roman emperor, he called Tiberias. His first wife was a daughter of Aretas, an Arabian prince called in 2 Cor. 11 king of Damascus; but, becoming enamoured of Herodias (q.v.), wife of his half-brother Herod Philip, a private citizen in Rome, he divorced his own wife and married her. By Herodias he had a daughter, Salômê. Antipas was denounced by John the Baptist (q.v.), who was first imprisoned and then, at the instigation of Herodias and Salômê, executed.

Jesus was examined before Herod, whose conduct on this occasion led to his reconciliation with Pilate. Defeated in battle by Aretas, A.D. 36, Antipas went to Rome c. 38-40, at the instance of Herodias, to secure the title of king, but was accused of treason and condemned by Caligula to perpetual banishment to Lugdunum (Lyons), whither Herodias accompanied him. He died in exile. *Consult* Matt. 14; Mark 6 and 8; Luke 3, 13, and 23; *Antiquities of the Jews*, F. Josephus, rev. ed. D. S. Margoliouth, 1906.

Herodas or **HERODAS** (3rd cent. B.C.). Greek writer of mimiambi, i.e. mimes or humorous sketches written in iambic metre. He was a native of Cos and a younger contemporary of Theocritus. In 1890 an Egyptian papyrus was found at Fayum, containing six of his mimes in a more or less perfect state. These short, dramatic pieces are written in the Ionic dialect and in the *sestos*, or "halting" iambic metre, in which a spondee (two long syllables) takes the place of an iambus (short and long syllable) in the



Herod Antipas. S. John the Baptist bound by order of the Governor of Galilee. Fresco by Andrea del Sarto, in the cloister of the Uffizi, Florence

last foot. A unique specimen of their kind, they consist of scenes from everyday life in dialogue form, in some parts reminiscent of Theocritus. The characters introduced are sometimes unpleasant, sometimes of a homely type. *Consult* A Realist of the Ægean, H. Sharply, 1906.

Herodians. Term applied to the family of Herods. Idumæan by descent and Jewish by faith, they sought the favour of Rome. They included Herod the Great, Herod Antipas, Herod Philip I, Herod Philip II, Herod Agrippa I and Herod Agrippa II. The term is applied also to those who, for various reasons, supported the political aspirations of the Herods and sided with the Pharisees and Sadducees against Jesus. *See* Matt. 22; Mark 3 and 12.

Herodian OR HERODIANOS (c. A.D. 170-240). Roman historian. A Greek by birth, he appears to have resided chiefly in Rome. His history, written in his native tongue and still extant, embraces the period from the death of Marcus Aurelius to the reign of Gordian III (187-238). In spite of geographical and chronological inaccuracies and lack of political insight, it is a lively and generally trustworthy account of contemporary events and forms a valuable supplement to the work of Dion Cassius (*q.v.*).

Herodias. Sister of Agrippa I. She left her first husband Herod Philip I and married his half-brother Herod Antipas (*q.v.*). This act brought down upon the two the condemnation of John the Baptist, whose head, at Herodias's request, was demanded and granted to her daughter Salômê, and involved Antipas in a disastrous war with his first wife's father. Herodias's ambition finally brought about the ruin of Antipas, with whom, however, she decided to go into exile. *See* Matt. 14; Mark 6.

Herodotus (c. 484-c. 425 B.C.). Greek historian, commonly called the father of history. Born at Halicarnassus in Caria, in Asia Minor, a city which, though peopled by Dorian Greeks, was under Persian rule, Herodotus was technically a Persian subject by birth. The first half of his life was spent in travel. He lived sometime at Samos, where he learned the Ionic dialect in which he wrote his history. About 446 B.C. he came to Athens, where he became intimate with the poet Sophocles. By the time he reached middle life he had travelled in Persia, Egypt, Italy, and Sicily, and had visited even

the N. shores of the Black Sea. During his travels Herodotus was diligently collecting materials for his history, but where the work was actually written is not known.

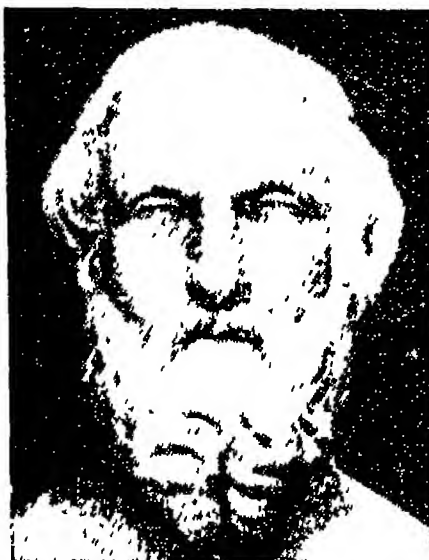
Its theme is the great struggle between the Persians and the Greeks, which was still fresh in the memory of the Hellenic world. The first five of the nine books are taken up with a sketch of the rise of the Persian empire, in which the author gives a history of Lydia as a preliminary, with historical and descriptive digressions on Egypt and other countries with which the Persians came into contact. The last four books deal with the actual clash of arms between Persians and Greeks, giving the immortal stories of Marathon, Thermopylae, and Salamis, and ending with the taking of Sestos by the Greeks in 478. The work is thus virtually a sketch of the history of the world, as then known, with geographical, archaeological, and other digressions.

Like the Greek tragedians, Herodotus held the belief that overweening arrogance among mortals slowly but surely brings in its train the punishment of heaven, and this idea runs all through the history. The work, as a whole, is one of the most fascinating ever written, perhaps the most enthralling section being the second book, which deals with the history and civilization of Egypt. With his clear and simple style, Herodotus is a master of narrative prose. He was the first to write history according to a plan or scheme, those that went before him being mere chroniclers.

His voracity has been impeached, but although his history contains much that is palpably untrue, Herodotus wrote in good faith. There are excellent translations of the history by G. Rawlinson and by G. C. Macaulay. *Consult* Herodotus, T. R. Glover, 1924.

Heroes and Hero Worship. Volume of lectures on Heroes, Hero-Worship, and the Heroic in History by Thomas Carlyle, 1841. The six lectures, delivered at Willis's Rooms, London, in May, 1840, comprise some of the best and most characteristic of Carlyle's vigorous and stimulating work. They deal successively with the hero as divinity, prophet, poet, man of letters, and king, taking as typical examples Odin, Mahomet,

Dante, Shakespeare, Luther, Knox, Johnson, Rousseau, Burns, Cromwell, and Napoleon.



Herodotus, Greek historian
Bust in Naples Museum

Heroic Play. Form of dramatic tragedy set up in the second half of the 17th century, of which Dryden was the chief, but not the first, exponent. The tragic drama had degenerated from the greatness of Elizabethan time, and an attempt was made to re-establish it more or less closely on French models, both in choice of themes and in the use of rhymed couplets.

In his essay *Of Heroic Plays*, Dryden credited his predecessor and collaborator, Sir William D'Avenant, with having originated them. He declared that the heroic play should be an imitation in little of an heroic poem (*i.e.* epic), and that love and valour ought to be its subjects.

The chief attempts of Dryden himself in this direction were *Tyrannic Love* or *the Royal Martyr*, 1669; *Almanzor* and *Almahide* or *the Conquest of Granada*, 1670, in which he came nearest to justifying his theory as to the suitability of his form; and *Aureng-Zebe* or *the Great Mogul*, 1675. The heroic play was made the satiric theme of *The Rehearsal*, 1671, by Buckingham and others.

Heroic Verse. Name given to the form of verse used in epic poetry, which deals with the life and deeds of heroes. In Greek and Latin, as in the *Iliad* and the *Aeneid*, the verse is hexameter. In English it is rhymed iambic pentameter, used by Dryden, and by Pope in *The Rape of the Lock*. The French adopted as the sole recognized form for dramatic and epic poetry the twelve-syllabled rhymed measure, with alternate masculine and feminine, single and double, rhymes, as in Corneille and Racine. In Italy the recognized form is the *Ottava Rima* (*q.v.*).

Heroin OR DIAMORPHINE HYDROCHLORIDE. Hydrochloride of the diacetyl derivative of morphine (*q.v.*), obtained by acting on morphine with acetic anhydride. Apart from relieving pain, it is sometimes (though less often than at one time owing to the ease with which addiction may be acquired) used to stop coughing. In the U.K. it is scheduled as a poison.

Hérolf, LOUIS JOSEPH FERDINAND (1791-1833). French composer. Born in Paris, Jan. 28, 1791,

ne studied music at the conservatoire there, and his first successful opera, *Les Rosières*, 1817, was notable for the originality of its orchestration. His most famous opera, *Zampa*, 1831, made him universally known; the overture is retained in the concert repertory. Hérold also wrote ballets, and composed for the piano. He died Jan. 19, 1833.

Heron (*Ardea*). Name given to the birds of the various genera of the family Ardeidae, which includes the herons proper and the bitterns. They are closely related to the storks and ibises, and include some 70 species distributed in all parts of the world, but specially numerous in tropical marshes and swamps. They are all carnivorous, feeding mainly on fish, frogs, and insects. All have long legs, long necks, and a long, straight, pointed beak. Most are bluish grey and white.

The European or common heron (*A. cinerea*) is a well-known inhabitant of Great Britain, and was formerly an object of the chase, being preserved for hawking. It still breeds in many parts of the country, usually in parks, where it is more or less protected. It is easily recognized by its crane-like form and the crest of long, blackish feathers at the back of its head. The plumage is grey on the upper parts, with greyish white below; the forehead, sides of the face, and front feathers of the breast being white. It is about 3 ft. in length, and the pointed beak is yellow.

The common heron feeds upon fish, frogs, snakes, and young mammals and birds, visiting the margins of streams and lakes at nightfall and early in the morning. It nests in colonies or heronries in the tops of tall trees, the nest being large, flat, and made of sticks with a lining of grass. There are several heronries in England.

Four other species occur occasionally in the British Isles. The night heron (*Nycticorax*) is found occasionally in spring and autumn. It is about 22 ins. in length, greenish brown on the back, with slate wings and tail and white underparts. The buff-backed heron (*Ardeola ibis*) is an extremely rare visitor from

S. Europe. Its colour is white, with the exception of the rusty buff head, neck, and breast. The squacco heron (*Ardeola ralloides*) is another variety, only 18 ins. long, with reddish buff neck and back, the rest of the plumage being mainly white. The purple heron (*Ardea purpurea*), common in Holland, is sometimes seen in spring and autumn. Ranging in length from 30 to 36 ins., it has its crown of the head and crest purple; the rest of the plumage is mainly grey and brown.

Heroult Furnace. One of the original designs of direct series electric arc furnaces, still widely used for steel smelting. In the early furnaces, two carbon electrodes were inserted through the roof and were suspended at some distance from the metal to be melted; as melting proceeded the electrodes were lowered so as to keep them a constant distance from the molten metal. The current jumped the gap from one electrode to the bath, forming an arc, and then



Heron. Specimen of the European *Ardea cinerea*

back from the bath to the other electrode, completing the circuit.

Modern furnaces, employing three-phase power, need three electrodes, suitably connected to the transformer. In some large furnaces, holding 100 tons or more of molten metal, the bath is made elliptical and two sets of electrodes are used. Usually the furnace is arranged so that it may be tilted for pouring and the electrodes may be raised well up to facilitate recharging. The carbon electrodes may be of the Soderberg type, the furnace heat carrying out the baking. Heroult furnaces are used for alloy steels, irons, and ferro-alloys. See Electric Furnace.

Herpes (Gr. *herpein*, to creep). Herpes simplex is an acute eruption of vesicles or blebs on the skin. The angles of the mouth, buttocks, nipples, and genital organs are most frequently affected. The cause is some filter-passing virus. Attacks may occur apparently spontaneously or in the course of pneumonia, influenza, and other diseases. Exposure to cold is sometimes a precipitating cause. The appearance of the vesicles may be preceded by a sensation of

heat or tingling. The vesicles develop in a few hours and are about the size of a pin's head. They dry up and disappear without leaving a scar in about ten days. Treatment consists in bathing the affected areas with boracic acid lotion and covering it with a little starch and zinc oxide powder. Brief local application of X-rays tends to prevent recurrence.

Herpes zoster (Gr., girdle), or shingles, is an acute eruption of vesicles occupying the area supplied by a nerve. It results from an acute infection of the posterior root ganglion of such a nerve by a filter-passing virus. Beyond coincidence this virus is in some way allied to that of chicken-pox. Outbreaks of the two complaints synchronise and the infections seem interchangeable. An attack of shingles is sometimes preceded by slight fever. Pain may be severe or slight. The blebs appear in a few hours along the course of a nerve and persist for about ten days, usually disappearing without leaving a scar. Protection of the affected part by cotton wool, and dusting with starch and zinc oxide powder, is the only treatment, with large doses of Vitamin B.

Herrenhaus. German word meaning house of lords. It was applied to assemblies of persons of rank who did not owe their seats to popular election, such as existed in Austria and Prussia before 1918.

Herrenhausen. A Palace just outside the town of Hanover, Germany, formerly the residence of the electors and kings of Hanover. An avenue of limes, 1½ m. long and 120 yds. wide, leads from the inner town to the palace. Built 1665 and completed by the first elector, Ernest Augustus, the father of George I and the husband of the electress Sophia, who died here, it was a favourite residence of George I, and remained a royal palace until the fall of the dynasty in 1866. Around it are gardens laid out in the French style, and in the grounds are an orangery, a theatre, and some fine fountains. It was damaged in the Second Great War.

Herrenvolk (Ger., master race). Title claimed by the Nazis for the German, and in general for the Nordic, peoples, as against the "slave" or "common herd" races. The term is derived from misinterpreted teachings of Nietzsche, who in *Wille zur Macht* (*Will to Power*) explains the different standard of morals between the ancient civilizations and those affected by Jewish, Christian,

and Socialist tenets as being due to "master" and "slave" consciousness respectively.

Herrera, ANTONIO DE (1559-1625). Spanish historian. After studying in Spain and Italy, he entered the service of Philip II, who made him one of his historiographers. His chief work is his *History of the Deeds of the Castilians in the Islands of the Pacific* (1601-15). He also wrote on the succession question in England and Scotland in the time of Mary Stuart, and a general history of the world in the time of Philip II. He died March 29, 1625.

Herrera, FRANCISCO DE (1576-1656). Spanish painter. Born at Seville, he studied under Luis Fernandez. He was a pioneer of the realistic movement in Spain, and had Velazquez among his pupils. Of intractable disposition, he once suffered imprisonment for illegal coining, and neither his children nor his pupils were able to live with him. At 74 he went to Madrid, where he worked for the court, under Velazquez's protection, until his death in that city. One may cite his four paintings of the Life of S. Martin in the church of that saint, and his Last Judgment in S. Bernard's, Seville.

Herreschoff Furnace. Type of furnace used for roasting ores as a preliminary to smelting. There are a number of superimposed hearths, the ore being fed into the top one, across which it is moved by a rotating, air-cooled rabble, fixed to a central shaft. The ore drops from hearth to hearth and is ultimately removed from the bottom. See *Calcination*; *Roasting*.

Herrick, ROBERT (1591-1674). English poet. Son of a goldsmith and born in London, he was baptized at the church of S. Vedast, Foster Lane, Aug. 24, 1591. It is thought that he was educated at Westminster School, on leaving which he was apprenticed to his uncle, a goldsmith. After graduating at Cambridge, where he was a student 1614-20, first at S. John's College and then at Trinity Hall, he returned to London, joined the Jonson circle, and in 1629 became vicar of Dean Prior, near Ashburton, Devon, where his wants were attended to by an old servant,



Robert Herrick,
English poet
From the frontispiece
of his "Hesperides"

Prudence Baldwin (the "Prue" of his poems). Ejected by the Puritans in 1647, he returned to his living in 1662, being buried at Dean Prior, Oct. 15, 1674. He had tried, not unsuccessfully, to be both the urban, witty companion and the quiet country pastor.

Described by Swinburne as "the greatest song-writer—as surely as Shakespeare is the greatest dramatist—ever born of English race," Herrick lapsed at times into indelicacy and is not immune from monotony, but at their best his *Hesperides* and *Noble Numbers* are exceedingly beautiful. Among faultless and well loved lyrics are those *To Anthea*; *To Dianeme*; *To Daffodils*; *Cherry Ripe*; and the lines beginning *Gather ye rosebuds*. Herrick could sound a sincere devotional note, e.g. in *A Thanksgiving to God for his House*; *Litany to the Holy Spirit*. An excellent edition of his poems is that by A. W. Pollard, 1891 and 1898. *A Life*, by F. W. Moorman, appeared in 1910; and there is a charming portrait in Rose Macaulay's novel, *They Were Defeated*, 1932.

Herries Chronicle. Fictional saga by Hugh Walpole. This series of novels concerning the fortunes of the squirearchal family of Herries is set in Cumberland, and extends from the mid-17th century to the 20th. Beginning with *Rogue Herries*, 1930, the series included *Judith Paris*, 1931; *The Fortress*, 1932; and *Vanessa*, 1933. The *Bright Pavilions*, 1940, dealt with an Elizabethan ancestor of the family.

Herring (*Clupea harengus*). Fish belonging to the same genus as the sprat and pilchard. It is found near land in the N. Atlantic, but not in the Mediterranean. The genus contains about 60 species, most of them available as food for man. The common herring is always found in shoals which swim near the surface of the sea, and are constantly moving from place to place following their food. The result is that the herring fishery is somewhat uncertain, a good fishing ground being often temporarily deserted.

The herring feeds mainly on minute crustaceans, called collectively zooplankton, filtering them out of the water by means of the gill-rakers at the side of the throat, which act as a kind of sieve like the baleen of the whale. It also eats small worms and the eggs and fry of its own and other species of fish. It avoids dense concentration of minute plant life called



Herring. Specimen of the common herring found in the Atlantic and northern seas

phytoplankton; therefore biologists can to some extent predict the position of herring by analysing the plankton. When alarmed, the herring will sometimes leap out of the water and be carried several feet through the air. There are two spawning seasons, summer and winter; but the winter spawners belong to a different race from the others. The eggs do not float on the surface, but adhere to the stones and weeds at the bottom of comparatively shallow water.

The summer eggs are deposited at some distance from the shore, but the winter ones are usually shed in brackish water about the mouths of rivers, and may even be found attached to the leaves of fresh-water plants. The average number of eggs deposited by the female is 30,000. These hatch in from ten days to a month, according to temperature, and the young fish take two to three years to become adult. Around the British coasts 12 ins. is a usual length for a full-grown fish, but in Iceland specimens 17 ins. in length are often taken.

Economically the herring is an important food fish, owing to its nutritious qualities and its great abundance. It is specially numerous in the North Sea and along the E. coast of Scotland, and the fishery is carried on by boats from most of the countries of N. Europe, especially Great Britain, Germany, and Holland. It is chiefly captured in the drift net, the seine being used in waters such as the sea lochs of Scotland. See *Fisheries*; *Trawling*.

Herring Industry Board. Established under the Herring Industry Act, 1935, and reconstituted by that of 1938. It is empowered by these and the Herring Industry Act, 1944, to reorganize, develop, and regulate the industry. The board administers schemes of grants and loans for the provision of fishing boats, nets, and gear; promotes research and experiments in processing; and controls production and export. Its h.q. is at 1, Glenfinlas St., Edinburgh 3.

Herrings, BATTLE OF THE. Fought Feb. 12, 1429, between the English and the French, the latter aided by their Scottish allies. The

English were besieging Orléans and a small force under Sir John Fastolf was carrying provisions from Paris to the army there. This was attacked by the French and Scots at Rouvray. The English formed a hollow square, the provision wagons being placed in the centre, and the enemy were beaten off. The battle was so called because the wagons contained quantities of salted fish for use during Lent. *See Hundred Years' War.*

Herriot, ÉDOUARD (1872-1957). French politician and author. Born at Troyes, July 5,



Edouard Herriot,
French politician
and author

1872, and educated at the École Normale Supérieure, he taught literature at Nantes and at Lyons, where he became a professor at the University. A Radical in politics, he was elected mayor of Lyons in

1905, and held the post almost continuously except during the Second Great War. He entered the senate in 1912, and in 1916 became minister of public works under Briand.

In 1924 he became premier and foreign minister. A protagonist of European cooperation, he made concessions to Germany and gave recognition to Soviet Russia; but in 1925 his government was defeated over plans for stabilising the franc, Herriot becoming president of the chamber. In July, 1926, he formed a government from the Left, but was forced to resign within a few days. He became minister of education in Poincaré's coalition cabinet, 1926-28, resigning his chairmanship of the Radicals. In 1932 he was again premier, for six months. Under Doumergue and Flandin he was minister of state, and in 1936 again president of the chamber. He opposed Pétain and Laval after the defeat of France in 1940, and was interned at Vittel. Transferred to Germany, he was liberated in April, 1945. In 1947 he again became mayor of Lyons. President of the national assembly from 1947, he was in 1948 chosen chairman of the Western Union committee. His great literary talent was overshadowed by his political career. His published works included *Agir*, 1917; *Créer*, 1919; *La Russie Nouvelle*, 1922; a life of Beethoven 1925; *The Well-*

springs of Liberty, 1940. Elected to the Academy in 1947, he died at Lyons March 26, 1957.

Herschel, Sir JOHN FREDERICK WILLIAM (1792-1871). A British astronomer. Born March 7, 1792, he was the only son of Sir William Herschel. Taking his degree as senior wrangler at Cambridge, he began a systematic study of the heavens in 1822, the results of which he presented to the Royal Society eleven years later. The whole northern hemisphere came under his survey, and he added over 500 nebulae and clusters of stars to those already known, as well as nearly 4,000 double stars. In 1834 he established an observatory at the Cape of Good Hope, in order to survey the southern hemisphere. Here his work continued for four years, the results being published in 1847.

Returning to England in 1838 he was created a baronet, received numerous honours from universities, was secretary of the Royal Society, and thrice president of the Royal Astronomical Society. Herschel wrote an *Outline of Astronomy*, 1849, and contributed articles on the theory of light and sound, and on the study of natural philosophy, to current encyclopedias. In 1850 he was appointed master of the mint, resigning 1855. He died May 11, 1871. *Consult The Herschels and Modern Astronomy*, A. Clerke, 1895.

Herschel, LUCRETIA CAROLINE (1750-1848). Hanoverian astronomer. Sister of Sir William Her-



Caroline Herschel,
astronomer

After M. G. Telemann

schel, she was born March 10, 1750, at Hanover, and came to England in 1772, becoming assistant to her brother. On his appointment as private astronomer to George III, she was given an annual salary of £50, and carried out independent observations under his instructions. An indefatigable worker, she discovered five new comets and a number of nebulae and star clusters; she added 561 stars to the catalogue published by Flamsteed. On the death of her

brother she returned to Hanover, where she died Jan. 9, 1848.

Herschel, Sir WILLIAM (1738-1822). Hanoverian astronomer. Born at Hanover, Nov. 15, 1738, he came to England in 1757, earning a poor livelihood by teaching music. In his spare time he studied astronomy, and in 1774 he made his first telescope. His success with this instrument encouraged him, and throughout his life he was concerned with the manufacture and improvement of telescopes. But his reputation will remain connected with his discovery of the planet Uranus in 1781. This brought many rewards, including the Copley medal and an F.R.S.

In 1782 Herschel was appointed private astronomer to George III. Soon honours were showered on him by British and foreign universities and scientific societies for his brilliant astronomical researches. He contributed nearly 70 papers to the *Philosophical Transactions*, all showing a remarkable power of reasoning. His systematic search of the heavens not only resulted in the discovery of a large number of double stars, and of Uranus, but also of two new satellites of Saturn.

To Herschel is due the first computation of the period of rotation of Saturn, that of the motions of binary stars, and the path of the solar system through the heavens. He increased the number of known nebulae from 180 up to 2,500. He demonstrated the disk structure of the Milky Way system. He was ably assisted in these researches by his sister Caroline. As a physicist, he demonstrated his discovery of infra-red rays to the Royal Society in 1800, when he showed that the spectrum of the sun is continued beyond the visible red into a region where, though invisible, it exerts a maximum heating effect. He died Aug. 25, 1822, at Slough. *See Astronomy; consult also Life and Works*, J. L. E. Dreyer, 1912; *The Herschels* (Chronicle, ed. C. A. Lubbock, 1933).

Herschell, FARRER HERSCHELL, 1st BARON (1837-99). British lawyer and politician. Born Nov. 2, 1837, he went to University College, London, was called to the bar from Lincoln's Inn in 1860, and in 1872 was made Q.C. In 1874 he was Liberal M.P. for Durham, and

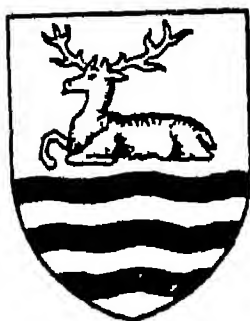


William Herschel's
After J. Russell, R.A.

in 1880 became solicitor-general. In 1886 he was made lord chancellor and created a baron. He retained the woolsack only a few months, after which he was one of Gladstone's followers. He again became lord chancellor 1892-95. In 1898 he represented Great Britain in the arbitration over the boundary of Venezuela, and he was still in the U.S.A. when he died March 1, 1899, at Washington. His many honours included the chancellorship of London university.

Herstmonceux. Alternative spelling of Hurstmonceux (*q.v.*).

Hertford. Mun. bor., market and co. town of Hertfordshire, England. It stands on the Lea,



Hertford arms

24 m. N. of London, and has two railway stations. It is picturesquely situated, and contains a large shire hall, and a county hall, opened in (1939), corn exchange, and public library. Of its churches, All Saints, 1895, replaced an earlier structure destroyed by fire in 1891; S. Andrew's is on the site of a building founded in pre-Norman times; and the R.C. church occupies the site of a Benedictine priory founded in the time of William I. Here are Christ's Hospital girls' school, and a boys' grammar school replacing that founded by Richard Hale in 1617, the buildings of which house a secondary school.

The castle, built by Edward the Elder in 905, and several times reconstructed, now serves as municipal offices. It incorporates parts of the ancient stronghold in which Isabella, widow of Edward II, died in 1358. Henry IV, Elizabeth I, and other sovereigns resided in the castle, which was taken by the parliamentary forces during the Civil War. Haileybury College is 2 m. S.E., and Panshanger, the former seat of Lord Desborough, is 2 m. N.W. Hertford's history goes back to the time of King Alfred. It has a large agricultural trade, and brewing, malting, printing, tanning, and brush making industries. It gives its name to a county constituency. Market day, Sat. Pop. (1951) 13,890. *Pron. Har'-ford.*

Hertford, FRANCIS CHARLES SEYMOUR CONWAY, 3RD MARQUESS OF (1777-1842). British peer. Born March 11, 1777,

he was the only son of the 2nd marquess and his wife, the daughter of the last Viscount Irvine, from whom came much of his great wealth. Educated at Oxford, he was an M.P.

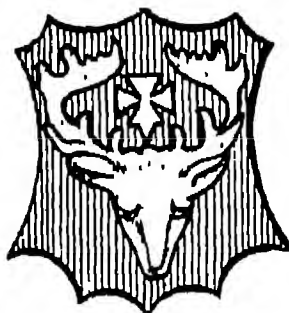


Hertford

After Lawrence

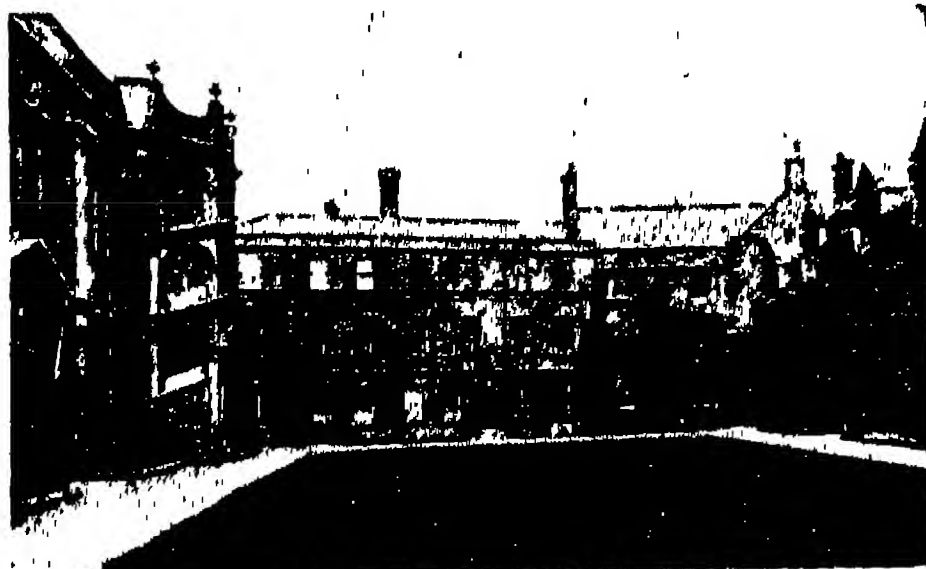
before succeeding to the title in 1822. He lived the life of a man of pleasure, and is the original of the marquess of Steyne in *Vanity Fair* and of Lord Monmouth in *Coningsby*. He died in London, March 1, 1842. The marquess married an heiress, Maria Fagniani, daughter of G. A. Selwyn, and had two sons. Richard Seymour Conway (1800-70), the elder, who became the 4th marquess, was a collector of pictures and works of art, which now form part of the Wallace Collection (*q.v.*).

Hertford College. College of the university of Oxford. It dates from about 1283, when Elias de Hertford founded a hall for students known as Hart or Hertford Hall. It became a college in 1740, but was dissolved in 1805, and later its buildings and property were



Hertford College arms

acquired by Magdalen Hall. In its turn Magdalen Hall was dissolved in 1874, when a new charter was obtained establishing Hertford as its successor and giving it all the privileges enjoyed by other colleges. T. C. Baring, M.P., provided funds for its endowment. The society consists of a principal,



Hertford College, Oxford. The quadrangle seen from the chapel, with the hall on the left

Frith

fellows, and scholars, and its buildings, mainly modern, are at the corner of Broad Street and New College Lane and in Holywell St. C. J. Fox was up at Hertford.

Hertford House. A London mansion associated with the Seymour family. In Manchester Square, W., it was begun in 1776 by the 4th duke of Manchester, after whom it was first named. In 1788 it became the Spanish embassy; later it passed to the 2nd marquess of Hertford, whose second wife was the attraction that drew George IV to become an almost daily visitor. Under the patronage of Lady Hertford, Theodore Hook here made his entry into fashionable life.



Hertford House. Mansion in Manchester Square, London, in which is housed the Wallace Collection

The 4th marquess bequeathed the house and his famous art treasures to Sir Richard Wallace, who reconstructed the building for their accommodation in 1871-75, and whose widow in 1897 bequeathed them, with additions, to the nation. Hertford House was bought by parliament and opened as a public art gallery in 1900. In both Great Wars the collection was removed for safety. It housed exhibitions arranged by the British Council in the Second Great War, when it suffered damage by German bombs. *See Wallace Collection.*

Hertfordshire or **HERTS.** One of the "home counties" of England, it has an area of 632 sq. m. and is bounded N. by Cambridgeshire, S. by Middlesex, E. by Essex, and S.W. by Bucks. Picturesque, especially on the W., its winding lanes and woods, manor houses and old churches, make it a favourite with lovers of rural scenery. The chief geological formations are the Cretaceous and the Tertiary. Much of the S. is London clay, characteristic of the Thames Valley. Along the N. border high ground runs in from Cambridgeshire, part of the chalk range of E. England, a Branch of the Chiltern Hills; the county is generally undulating.

Of its 17 small streams the most important are the Colne and Lea.

The former rises between Hatfield and St. Albans, is joined by the Ver near Watford, and the Gade and Choss at Rickmansworth, and then enters Middlesex. The Lea, the largest river of the county, rises in Bedfordshire and enters Essex at Waltham Abbey.



Hertfordshire arms

Nearly parallel with the Lea is the artificial New River which, fed by springs near Hertford, brings water to London. The Grand Union Canal passes through Rickmansworth, Boxmoor, and Berkhamsted.

Agriculture, market gardening, and the cultivation of fruit for the London market are leading pursuits; permanent pasture abounds and hay is largely produced. There are no minerals of commercial importance and no manufactures on an extensive scale. The industries include straw plaiting, paper making, malting, brewing; lace, silk, and agricultural machinery are produced.

Main line rlys. from Euston, St. Pancras, and King's Cross, also the Met. rly., serve the county, supplemented by the Green Line services. Of the roads the chief are the Old North Road, the Great North Road, and the Dunstable Road; and there are remains of

three Roman roads, Watling Street, Ermine Street, and the Icknield Way. The chief towns are Hertford (co. town), St. Albans (a cathedral city), Watford, Hitchin, Barnet, Berkhamsted, Hatfield, Bishop's Stortford, and Ware. The co. includes Welwyn Garden City, and Letchworth, also a garden city. Stevenage and Hemel Hempstead were scheduled as new towns after the Second Great War.

The county was once part of Mercia and of Essex. St. Albans, as Verulamium, was a Roman city. William I held a council at Berkhamsted, where, as at Hertford, are remains of an old castle. Henry III had a palace at King's Langley. Elizabeth I lived at Ashridge Park, was a prisoner at Hatfield, the historic home of the Cecils, and had a hunting lodge at Hunsdon. The only English pope, Adrian IV, was born at Abbots Langley. Rye House, near Hoddesdon, is associated with a plot to murder Charles II and James, duke of York. At St. Albans and Barnet were fought historic battles of the Wars of the Roses. The co. forms six co. and one bor. constituencies. Pop. (1951) 600,735.

LITERARY ASSOCIATIONS. Bacon lived at Gorbamby, took his title of viscount from St. Albans, and was buried in the church of St. Michael. Chaucer was a clerk at Berkhamsted Castle. With St.

Albans are associated the names of Matthew Paris, Sir John Mandeville, Dr. Cotton; it is the background of Dickens's novel, *Bleak House*. Chapman lived at Hitchin; Young, author of *Night Thoughts*, was rector of Welwyn, and is buried there. Cowper was born at Berkhamsted, and introduced Ware in the poem about John Gilpin. Isaac Watts lived at Theobalds; Bulwer Lytton at Knebworth. With Lamb are associated Mackery End and Wilford. Hoddesdon has memories of Prior and Izaak Walton. George Bernard Shaw's residence, Ayot St. Lawrence, is near Welwyn. At Radlett lived Émile Cammaerts, Belgian author. The *Victoria History of the co.* appeared in 4 vols., 1912-14.

Hertfordshire Regiment. Regiment of the British Army formed when the Territorial Force, now the Territorial Army, was organized in 1907. It consists of territorial battalions only. For administrative purposes it forms part of the corps of the Bedfordshire and Hertfordshire Regiment. In the First Great War it served in France throughout; in the Second Great War it had battalions in Africa, Italy, France, and Malaya.

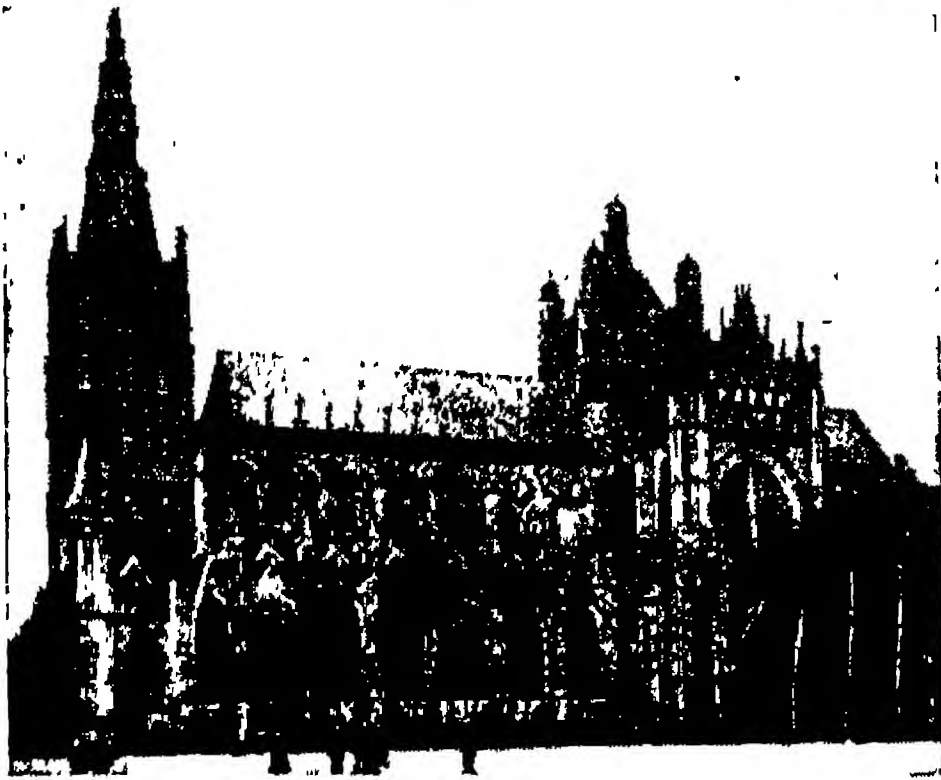
Hertha. A Teutonic goddess. Called also Northus, she was the goddess of fertility. Our scanty information about her worship is derived from Tacitus, who, in his *Germania*, gives a brief account of certain mysterious ceremonies which took place on an unknown island, usually at night, her image and vestments being bathed in the lake after the rites. Her statue was veiled.

's Hertogenbosch or Bona-De-Duc (Dutch and Fr., duke's wood). Town of the Netherlands, capital of N. Brabant. It stands at the confluence of the Aa with the Dommel, 33 m. S.S.E. of Utrecht, and is a rly. junction and well served by canals. Its splendid Gothic cathedral of St. John, dating from the middle of the 15th century, was built on the site of an 11th century Romanesque structure, and is noted for rich ornamentation, lofty nave with double aisles, and beautiful choir and pulpit. The Raadhuis, in the Great Market, contains fine paintings, and the provincial museum houses antiquities. Other buildings of note are the government buildings, court house, episcopal palace, arsenal, barracks, and grammar school. The town was strongly fortified until its defenses were razed in 1870.



Hertfordshire. Map of the county to the north of Middlesex, famous for its agriculture and market gardening

Industries are concerned with machine shops, glass, carriages, bicycles, iron foundries, ship-building, cigars, linen, printing. The town is a market for cattle and agricultural and dairy products. The duke commemorated by the name is probably Godfrey III of Brabant, who c. 1070 built a hunting castle in the woods.



's Hertogenbosch. The cathedral of St. John, an 11th century foundation, rebuilt 1419-50

Hendrik I granted municipal privileges in 1184. During the Second Great War 's Hertogenbosch was a key point in the German defence system in the Netherlands. It was liberated by troops of the 2nd British army, Oct. 26, 1944. No buildings of historical importance were destroyed. Pop. (1955) 64,787.

Hertwig, OSCAR (1849-1922). German anatomist and embryologist. Born at Friedberg, April 21, 1849, he studied medicine at Jena and Bonn, and in 1878 became professor of anatomy at Jena. In 1888 he was appointed director of the institute of anatomy and biology in Berlin. Hertwig was the first biologist to demonstrate that fertilisation is basically the fusion of two nuclei: that of the ovum and that of the sperm. His other principal contributions to biology were his investigations into the malformations of vertebrate embryos called *spina bifida*; the germ-layer theory; and the parallelism in gametogenesis in the two sexes of ascaris. Hertwig resigned his post at Berlin in 1921 and died Oct. 26, 1922. He was a voluminous writer on embryology, his more important works being: *Contributions to the Knowledge of Fertilisation*, 1876; *Text Book of the Evolutionary History of Men and Invertebrate Animals*, 1888; *Cells and Tissues*, 1898; *Studies in Animalculae*; *World Biology*, 1920.

Hertz, GUSTAV (b. 1887). German physicist. Born in Hamburg, July 22, 1887, a nephew of Heinrich Hertz, he studied electricity, and in 1920 joined the firm of Philips at Eindhoven, Holland. In 1925 he became a professor at the university of Halle, and in 1928 at the technical high school at Charlottenburg. In 1926 the Nobel prize for physics was awarded to him, jointly with James Franck, for

their experiments on the production of the emission of spectral lines through electronic bombardment, which laid the foundations of the proof of the quantum theory of light.

Hertz, HEINRICH RUDOLF (1857-94). German physicist. Born at Hamburg, Feb. 22, 1857, his name will always be associated with the discovery of the Hertzian waves of wireless telegraphy. In 1880 he became assistant to Helmholtz at the Berlin Institute, where he carried out a series of researches on electric discharge in gases. On his appointment to the professorship of physics in 1885 at Karlsruhe Polytechnic, inspired by the electro-magnetic theories of Clerk-Maxwell, Hertz began the study of electro-magnetic waves.



Heinrich Hertz, German physicist

Hertz showed the refraction, diffraction, and polarisation of the electric waves and their correspondence with those of light and heat. The practical results he obtained, particulars of which he published in 1887, were no less brilliant than were the mathematical researches of Clerk-Maxwell. Their importance cannot be overestimated, for upon them has been based the whole of wireless communication. Till his death, Jan. 1, 1894, Hertz continued to publish regularly papers on his remarkable discoveries, and many were translated into English in 1896 by D. E. Jones and G. A. Schott. See *Electro-Magnetic Wave*.

Hertz, HENRIK (1798-1870). Danish poet and dramatist. Educated in Copenhagen, where he

was born Aug. 25, 1798, he began to study law, but his early writings—among them *The Letters of a Ghost*, 1830, brought him into such prominence that, after a journey on the Continent at the public expense, he settled down to literature with a subsidy from the state and the title of professor. Among his best known poetical dramas are *Svend Dyring's House*, 1837, and *King René's Daughter*, 1845, Eng. trans. Theodore Martin, 1850, new ed. 1894. His *Poems* appeared 1851-62, and *Collected Dramatic Works*, 1854-73. He died Feb. 25, 1870.

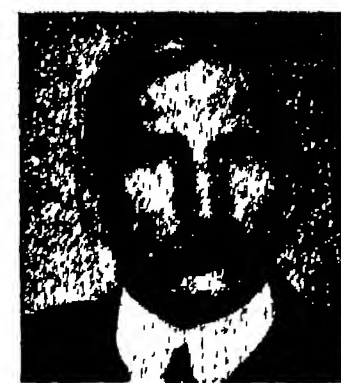
Hertz, JOSEPH HERMAN (1872-1946). Chief rabbi of the British Empire. Hertz was born at Rebr-



Joseph H. Hertz, Jewish rabbi

rin, Slovakia, then in Hungary, Sept. 25, 1872, and emigrated as a child to New York, where he was educated at Columbia university and the Jewish theological seminary of America. He became a rabbi of Syracuse, New York, in 1894 and at Johannesburg in 1898, being expelled by President Kruger for his pro-British sympathies and for advocating the removal of the religious disabilities of Jews and R.C.s in the Transvaal republic. Hertz was professor of philosophy at the Transvaal university college, 1906-08, and became a rabbi in New York City, 1912. From 1913 he was chief rabbi of the United Hebrew Congregations of the British Empire. The founding of a Jewish national home in Palestine owed much to his advocacy. He published *A Book of Jewish Thoughts*, and numerous works on Jewish and educational subjects. Hertz was made C.H. in 1943, and died in London, Jan. 14, 1946.

Hertzog, JAMES BARRY MUNIK (1866-1942). South African statesman. Hertzog was born of Dutch-German stock at Wellington, Cape Colony, April 3, 1866, and educated at Victoria College, Stellenbosch, and Amsterdam



J. B. M. Hertzog, S. African statesman

university, Netherlands. One of the Boer generals in the S. African war, 1899-1902, he afterwards became an ardent and doughty champion of

Boer nationalism. He was a member of the first Union cabinet, 1910-12, but his animosity against Botha and General Smuts and his anti-British views led to his retirement. In 1915 he was elected leader of the Nationalist party, becoming prime minister in 1924.

During 1933 a rapprochement was effected between Hertzog and Smuts, which led to the formation of the United South African Party, 1934, and of a national government in which the former continued as prime minister until he resigned in Sept., 1939, when parliament approved Smuts's motion in favour of active participation in the Second Great War. He resigned his seat and the leadership of his party in 1940, and died Nov. 21, 1942. *Consult* General Hertzog. L. E. Neame, 1930.

Hertzsprung, EJNAR (b. 1873). Danish astronomer. Born Oct. 8, 1873, at Copenhagen, he was educated at St. Petersburg (Leningrad) and Leipzig, and held posts in the observatories of Copenhagen, Göttingen, Potsdam, and Leyden. He found how to measure the intrinsic brightness of stars from their directly observable features—spectra, colours, and proper motions. He shares with the American astronomer Russell the discovery in 1905 that stars as a whole can be classified as giants or dwarfs. In 1913 he first measured great stellar distances by using the periods of variable stars; in 1922 he deduced stellar radii from their surface temperatures. He was awarded the gold medal of the Royal Astronomical Society in 1929.

Heruli or **ERULLI**. Ancient Germanic people. Their original home is said to have been in the Cimbric Chersonese (Jutland). In the 3rd century A.D. they raided the steppes near the Black Sea and the Danube, in alliance with the Goths. A warlike people, they were ready to serve any leader as mercenaries. In the 5th century they established a kingdom in the basin of the Elbe, but about the beginning of the 6th century they were overthrown by the Langobardi and dispersed, some of them entering the Roman service.

The Heruli are said to have adhered to paganism longer than any other Germanic people, and until their dispersal they retained customs of widow-sacrifice and geronticide (killing the old).

Hervas y Panduro, LORENZO (1735-1809). Spanish philologist. Born May 10, 1735, he became a Jesuit, and held professorships at

Madrid and Murcia. On the expulsion of the Jesuits from Spain in 1767, he settled in Italy, where he produced his great work, *Idea of the Universe*, 21 vols., 1778-92. He also wrote *Catalogue of the known languages*, and other works on philology, to which study he gave a great impetus, especially in Italy. He was librarian of the Quirinal Palace, Rome, from 1803 until his death, Aug. 24, 1809.

Hervey, JOHN HERVEY, BARON (1696-1743). English politician and author. Son of John Hervey, earl of Bristol, he was born Oct. 15, 1696, belonging to the family of whom it was said that God made men, women, and Herveys, so notable was their pride. He was educated at Westminster and Clare Hall, Cambridge. In 1725 he entered Parliament, attaching himself to Sir Robert Walpole. The confidence of Queen Caroline gave him political importance, both before and after he became lord privy seal in 1740.

In 1733 he was made a baron. He did not live long enough to inherit his father's earldom, dying Aug. 5, 1743. Three of his sons became in turn earl of Bristol. As a writer, Hervey is chiefly known for his *Memoirs of the Court of George II*, which show the king and his son Frederick, prince of Wales, in a very unfavourable light. They were edited by J. W. Croker, 1848; by R. Sedgwick, 1931. Hervey was satirised by Pope, to whom he replied with almost equal bitterness. *See* Bristol, Marquess of.

Hervey, JAMES (1714-58). English clergyman and devotional writer. Born at Hardington, near Northampton, February 20, 1714, he was educated at the local grammar school and at Lincoln College, Oxford, where he was greatly influenced by John Wesley. Later he attached himself to the Calvinists. He succeeded to his father's livings at Weston Favell and Collingtree, was remarkable for his benevolence, and died on Dec. 25, 1758.



James Hervey,
English clergyman
From an engraving



Lord Hervey
After Vanloo

His works include *Meditations and Contemplations*, 1746-47, which contain *Meditations among the Tombs*, turgid and unnatural in style, but once extraordinarily popular; *Contemplation on the Night*, 1747; and *Dialogues between Theron and Aspasius*, 1755, which led to a controversy on the nature of faith with Robert Sandeman (*q.v.*). Hervey contended that justification by faith meant appropriation; Sandeman, that the vital thing was not the manner of believing, but the matter of belief. *Consult* *Life and Letters*, T. Birch, 1782; *Works*, 6 vols., 1769.

Hervey Archipelago. Group of islands in the Pacific Ocean, also known as Cook Islands, under which name it is described in this Encyclopedia.

Hervey Bay. Bay on the coast of S. Queensland, Australia. The east side is formed by Great Sandy Island, one of the sandy islands which interfere with coastal navigation. On the west side is the sugar and cattle-rearing area, of which the commercial centre is the small port of Bundaberg, which is situated at the beginning of the bay, here some 50 m. across. At the head of the bay in the south a narrow sea channel separates Gt. Sandy Island from the district of Maryborough.

Hervieu, PAUL ERNEST (1857-1915). A French dramatist and novelist. Born at Neuilly-sur-Seine, Nov. 2,



Paul Hervieu

1857, he was educated for the law, and called to the bar in 1877. Later he entered the diplomatic service, but in 1881 he resigned and thenceforward devoted himself to journalism and literature. His first novel, *Diogène-le-Chien*, 1882, was followed by a collection of journalistic narratives, *La Bêtise Parisienne*, 1884; *L'Inconnu*, 1887; *Flirt*, 1890; *Peints par eux-mêmes*, 1893; and *L'Armature*, 1895.

In his stories he showed close knowledge of life, and charming literary fancy. Having established himself as a novelist, he won fresh and greater fame as a dramatist, his principal plays being *Les Paroles Rostent*, 1892; *Les Tenailles*, 1895; *La Course du Flambeau*, and *L'Enigme*, 1901, produced in English as *Cæsar's Wife*, in the following year; *Théogène de Mérocourt*,

1902; *Le Dédale*, perhaps his best, 1903; *Le Réveil*, 1905; *Connais-Toi*, 1909. He was elected to the French Academy in 1900. His collected plays were published in 3 vols., 1900-04. He died Oct. 25, 1915.

Herzegovina. District of S.E. Europe, part of the federative republic of Bosnia-Herzegovina (*q.v.*), Yugoslavia.

Herzen, ALEXANDER IVANOVICH (1812-70). Russian publicist. Born at Moscow, the illegitimate son of a rich nobleman Yakolev, he was exiled at the age of 23 to Siberia on account of his advanced views, and again in 1841 to Novgorod.

Herzen's father leaving him a fortune, he removed to Paris, whence he was banished, and went to Nice. In 1850 he published, in German, *Vom Andern Ufer* (from the other shore), in which he proclaimed the end of the old European system and its regeneration by the Russian community. Then came, in French, *Du Développement des Idées Révolutionnaires en Russie*, 1851, Eng. trans. 1853.

Herzen removed to London, where he set up a Russian printing press and started a revolutionary periodical, *The Polar Star*, and on July 1, 1857, began to issue a weekly revolutionary journal, *Kolokol* (The Bell), which was smuggled into Russia in hundreds of thousands. In 1859 he published, in English, *Memoirs of Catherine II and the Princess Dachkov*. He died in Paris, Jan. 21, 1870. His memoirs were translated into English under the title *My Past and Thoughts*, 1924-28.

Herzen's daughter Olga (1850-1953) married the distinguished scholar Gabriel Monod and died in Paris.

Herzl, THEODOR (1860-1904). Zionist leader. Born May 2, 1860, at Budapest, he was a journalist in Vienna. His *Der Judenstaat*, 1895 (Eng. trans., 1896), inspired the Zionist cause. He died in 1904 and was buried in Vienna. His remains were reinterred, 1949, near Herzl Hill. See *Zionism*.

Heseltine, PHILIP (1894-1930). British composer better known as Peter Warlock (*q.v.*).

Heshbon. Ancient city of Palestine. It stood at the N.E. corner of the Dead Sea, and was the capital of Sihon, king of the Amorites. It was captured by the Israelites on their way to Canaan (Num. 21, v. 25).

Hesiod (*fl.* c. 700 B.C.). Greek didactic poet. He lived at Ascra,

at the foot of Mt. Helicon, in Boeotia, his father having been an immigrant from Kymē, in Asia Minor. Details of his life are obscure, but there is reason to believe that he lost his patrimony in a lawsuit against his brother, Perses, who bribed the judge. As a result of this, Hesiod removed to the neighbourhood of the Gulf of Corinth, where he spent the rest of his life, until, according to legend, he was murdered. He was a farmer by profession.

One of his poems, *Works and Days*, is a didactic poem, part of which is virtually a manual of agriculture, to which Virgil is much indebted. Another part of the poem is a sort of moral essay on the dignity of labour, and the injustice of rulers and judges.

Hesiod's other surviving poem, *Theogony*, is an account of the creation of the world, and a history of the gods and demi-gods. The two poems *The Shield of Heracles* and *The Contest of Homer and Hesiod* are not genuine. In later ages Hesiod was much used as a school book. The best edition of the text with English notes is that of Paley, 1883, and there are prose translations in Bohn's *Classical Library*, by J. Banks, and by A. W. Mair, 1908.

Hesionē. In Greek mythology, daughter of Laomedon, king of Troy. Poseidon and Apollo, offended by Laomedon, sent a monster to whom yearly a maiden had to be sacrificed. Hesionē was about to suffer this fate when she was rescued by Hercules, who slew the monster with his club. Hercules had been promised a team of beautiful horses as a reward, but Laomedon refused to keep his promise. Hercules therefore killed the deceitful king, set Priam on the throne in his stead, and married Hesionē to his friend Telamon. *Pron.* hē-sī onee.

Hesperia (Gr. *Hesperos*, evening star). Term applied by the Greek poets to Italy as being the western land. Roman poets sometimes applied the name to Spain.

Hesperides. In Greek mythology, nymphs who guarded the golden apples of Hera (*q.v.*). Their gardens were variously fixed in the Far West by different legends. The quest of three of these golden apples was one of the twelve labours of Hercules.

The name *Hesperides* was used by Robert Herrick (*q.v.*) as the title for a series of his poems.

Hesperornis (Gr. *hespera*, evening, west; *ornis*, bird). One of the fossil birds of the Cretaceous

system. It is remarkable for possessing teeth, and so indicating the descent of birds from reptiles. Only extremely rudimentary remains have been found in Kansas, but from these it has been deduced that the bird was three feet tall, and probably a strong swimmer, though unable to fly. See also *Odontornithes*.

Hesperos. In Greek mythology, the name of the evening star. The Romans spelt the name *Hesperus*, in which form it is usually met in English.

Hess. Name of a family of German artists. Karl Ernst Christoph Hess (1755-1828) was a painter and engraver. His son, Peter von Hess, was born at Düsseldorf, July 29, 1792, and, having served in the Bavarian army during 1813-15, became well known as a painter of battle scenes. Examples of his spirited work were to be found at Berlin and Munich. He died at Munich, April 4, 1871. Heinrich Maria von Hess was born on April 19, 1798, studied in Munich and Rome, and became director of the Munich galleries. His work was chiefly of a religious character, notable examples being decorations in the chapel of All Saints and the basilica at Munich. He died there on March 29, 1863. Another brother, Karl (1801-74), was a painter of attractive Alpine landscapes and genre pictures, some of which were in the National Gallery, Berlin.

Hess, DAME MYRA (b. 1890). British pianist. Born in London Feb. 25, 1890, she became a pupil of Tobias Matthay, and made her début in 1907.

She later made several world tours, and became one of the most popular pianists of her generation in Great Britain and the U.S.A.

A fine interpreter of Bach, Scarlatti, and Mozart, she organized lunch-time concerts at the National Gallery, London, 1939-46, for which enterprise she was created D.B.E., in 1941.

Hess, VICTOR FRANCIS (FRANZ) (b. 1883). Austrian-born U.S. physicist. He was born at Waldstein, June 24, 1883, and was educated at Graz University. After being a lecturer at Vienna University, 1910-20, he became director of the research laboratory of



Myra Hess,
British pianist

the U.S. radium corporation, New York, 1921-23. He was professor at Graz 1925-31 and 1937-38, at Innsbruck 1931-37, but after Hitler's occupation of Austria he left the country and from 1938 was professor of physics at Fordham University, N.Y.C.

For his brilliant investigations into cosmic radiation he shared with C. D. Anderson of the U.S.A. the Nobel prize for physics in 1936.

Hess, WALTER RUDOLF (b. 1881). Swiss physiologist. Born at Frauenfeld, Switzerland, March 17, 1881, and educated at Frauenfeld high school and the Universities of Lausanne, Berne, Berlin, Kiel, and Zürich, he specialised in diseases of the eye and brain, and, after a period as a consulting oculist, was, during 1917-51, director of the physiological department of Zürich University.

Chosen president of the 16th international congress of physiology in 1938, he was in 1949 joint winner (with A. E. Moniz) of the Nobel prize for physiology and medicine, the award being made to Hess for his discovery of the functional organization of the middle brain in coordinating the activity of the internal organs. He published a number of papers on various aspects of physiology, including some on plant physiology. His recreation was gardening and the care of fruit trees and vineyards.

Hess, (WALTHER RICHARD) RUDOLF (b. 1894). German Nazi leader. Born at Alexandria, Egypt,



Rudolf Hess,
German politician

April 26, 1894, he studied there, at Neuchâtel, Switzerland, and at Godesberg, Germany. In the First Great War he was commissioned as an airman, and saw service in France, where he met Hitler. After the war he studied

at Munich, coming under the influence of Haushofer (*q.v.*). He joined the Nazi party in 1920, and was imprisoned with Hitler in 1923, becoming his secretary the same year and assisting him in the writing of *Mein Kampf*.

Blindly devoted to Hitler, Hess was made head of the party organization in Dec., 1932, group leader of the S.S., and, April, 1933,

Reich minister without portfolio and deputy Führer. As from July 27, 1934, all bills and decrees had to be submitted to and passed by him before becoming law and, when Hitler launched the Second Great War, Hess, Goering, and Keitel were appointed a triumvirate to act in his place in emergencies, and Hess was made second in succession, after Goering, in case of Hitler's death. Hess flew alone May 10, 1941, from Augsburg to Scotland, landing by parachute near Glasgow, with the idea of persuading Great Britain to a compromise peace. This was one of the most surprising incidents of the war. His mission was a failure, and he was interned at Maidiff hospital, Abergavenny. Indicted in the Nuremberg trials, 1945-46, as a major war criminal, he was sentenced, on account of his mental instability, to imprisonment for life, Oct., 1946. Consult The Case of Rudolf Hess, J. R. Rees, 1947.

Hesse. Former grand duchy and (1918-45) state, now a *Land*, of W. Germany. The state had an area of 2,970 sq. m., and pop. 1,469,909. Upper Hesse was separated from the other two provs. by part of Prussia; Wimpfen and other small areas were also isolated. Both the Rhine and the Lahn flow through Hesse. There are a number of hills, but much of the land is flat. Darmstadt was the capital, and before 1866, when there were several states of Hesse, the grand duchy was known as Hesse-Darmstadt. Mainz was the largest town; others were Offenbach, Worms, and Giessen. Agriculture was the main occupation, rye, barley, potatoes, and vines being grown. Coal and iron were mined.

The name of Hesse is that of a tribe, the Chatti, later Hessi. Hesse, a big country already in the 8th century, was in the kingdom of the Franks, in the empire of Charlemagne, and afterwards in the Reich. The counts ruled in the region watered by the Fulda, Werra, Lahn, and Eder, which included the important places, Fulda, Hersfeld, and Marburg. One of its own counts, Conrad I, became German king, 919; from 1122 until 1247 Hesse was united with Thuringia, whence in 1265, Henry, a son of the duke of Brabant, inherited the title of landgrave of Hesse. He was later made a sovereign prince of the empire.

The rulers of Hesse lived and fought very much as did the other

German princelings of the Middle Ages. They divided their lands to form principalities for their sons, but such divisions were not always permanent. The first Landtag appeared about 1387, and gradually the landgraves won their way to the front rank of German princes. The most notable of them was Philip, who figured prominently in the events of the Reformation.

When Philip died in 1567, to provide for his four sons Hesse was divided into Hesse-Kassel, Hesse-Darmstadt, Hesse-Marburg, and Hesse-Rheinfels. Hesse-Homburg was founded in 1622, Hesse-Philippsthal in 1685, and Hesse-Barchfeld in 1721. Hesse-Marburg, Hesse-Rheinfels, and Hesse-Homburg, their ruling families having died out, were united with Hesse-Darmstadt or Hesse-Kassel. Hesse-Kassel was seized by Prussia after the war of 1866; the two other principalities lost their status in the Napoleonic upheaval.

Hesse-Darmstadt thus became the only Hesse. Its connexion with Prussia became closer, and in the war of 1870-71 its troops fought under Prussian generals. The grand-duchy joined the new German empire in 1871, and as such took part in the war of 1914-18. In 1918 the grand duke, Ernest Louis, abdicated, and a republic was proclaimed. This, in turn, was made a Gau by the Nazis. After the Allied conquest of Germany, 1945, most of the country came into the U.S. zone of occupation, and the former territories of the Hessian dynasties were reunited as Greater Hesse (later Hesse) of about 9,000 sq. m. in area, and about 4 million inhabitants, its capital Wiesbaden, and largest town Frankfurt-on-Main. The former Hessian territory W. of the Rhine came under French occupation.

Hesse, HERMANN (b. 1877.) A German-born Swiss poet and author. Born July 2, 1877, at Calw in Württemberg, Hesse became a book-seller. His first lyrical poems were published in 1898, but he gained fame by his educational novel *Peter Camenzind*, published 1904, and many times reprinted. Other novels, usually dealing with the child and adolescent mind, and of a somewhat melancholic and resigned trend, included *Knulp*, *Der Steppenwolf*, and his great romantic novel *Narziss und Goldmund*, 1930. Criticism, philosophical writing, and remarkable travel-diaries made Hesse one of the foremost in German authorship of his day. An anti-Nazi, he emigrated to

Switzerland before Hitler achieved power making his home near Lugano. He was awarded the Nobel prize for literature in 1946.

Hesse - Darmstadt. Name borne until 1866 by the German state later known as Hesse (*v.s.*). It dated from 1567, when on the death of the landgrave, Philip of Hesse, his lands were divided; his son, George, made Darmstadt the capital of the share he received, his little state being known therefore as Hesse-Darmstadt. He and his successors added to its area, especially when other branches of the family died out. In the 17th and 18th centuries the landgraviate shared in the history of Germany, a record chiefly of civil strife or of wars against France.

Louis, who became landgrave in 1790, fought against France until 1799, but was afterwards on the side of Napoleon. For this Mainz, Worms, and the duchy of Westphalia, lost again in 1813, were given to him in 1803, and the title of grand-duke in 1806. He deserted Napoleon in 1813, and at the congress of Vienna Hesse became the size it retained until 1866. This state joined the Germanic Confederation (1815-66), the Prussian Zollverein, and received a constitution in 1820. There were troubles between ruler and ruled, especially in 1848. In 1866 the grand-duke took the side of Austria. Consequently, after Prussia's victory, a large indemnity was demanded and paid, while Hesse-Homburg, just added to the grand duchy, was taken away.

In 1946 the Hesse-Darmstadt crown jewels, valued at £375,000, were stolen from Kronberg Castle, and three U.S. army officers, including a woman, were charged with the theft. The woman, Mrs. K. N. Durant, was tried and convicted by a U.S. military court at Frankfurt and sentenced to five years' hard labour and dishonourable discharge from the army.

Hesse-Homburg. Formerly a state of Germany. It consisted of a district round Homburg that was separated from the state of Hesse-Darmstadt in 1622. It had its own rulers or landgraves, but these did not become independent of the landgrave of Hesse-Darmstadt until 1768. Hesse-Homburg was included in Hesse-Darmstadt, 1806-15, when its independence was restored and Meisenheim, a small district on the other side of the Rhine, was added to it. In March, 1866, the landgrave Ferdinand died without sons and his territory was divided. The ruler of

Hesse-Darmstadt secured Hesse-Homburg proper, while Meisenheim became Prussian. A few months later Prussia took Hesse-Homburg also, after the war of 1866. The landgraviate had an area of 107 sq. m.

Hesse-Kassel. State of Germany that existed from 1567 to 1866. In 1567 the landgrave of Hesse, Philip, died, and his land was divided between his four sons. The largest share, which was taken by the eldest, William, had Kassel for its capital, and was, therefore, known as Hesse-Kassel. In 1648, at the end of the Thirty Years' War, the territory was enlarged, and there were various later alterations of its boundary.

In the 18th century the rulers obtained money by hiring their soldiers to fight the battles of others, and Hessians fought for Britain in the war of American Independence and elsewhere. In 1785 William IX became landgrave, allied himself with Prussia, and in 1803 was made an elector. In 1807 Hesse-Kassel was included by Napoleon in the kingdom of Westphalia, but it was restored to William in 1813; the title of king was, however, refused to him. Then, as elsewhere, followed grave internal troubles due to the desire of the people for a share in the government and to the refusal of the ruler to grant it. A constitution was given in 1831, but everything possible was done to nullify it, and there was again serious trouble in 1848. After trying to rule by force the elector Frederick William fled, 1850; the country was then entered by Austrian and Bavarian troops. Prussian troops also invaded Hesse, but the upshot was not war between the two parties, but the convention of Olmutz; Hesse was entrusted to the diet of the German Confederation which gave to it a new constitution. The elector, who had returned, refused to adapt his policy to the new conditions, and there was friction for a further decade. In 1866 he took sides with Austria against Prussia, and as a result Hesse-Kassel was occupied by troops of the latter power. By the treaty of peace it was annexed to Prussia.

The electorate was not a single district, but several detached areas, this being due to the way they were acquired. It had in 1866 an area of 3,800 sq. m. and a pop. of about 750,000.

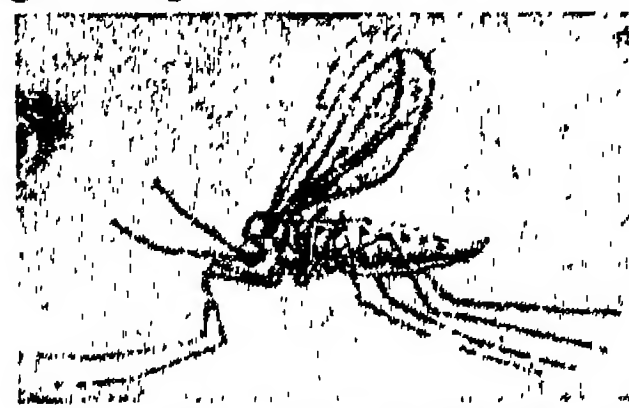
Hesse-Nassau. Former province of Prussia. It lay between the Rhine and Thuringia, its other boundaries including Bavaria and

Westphalia, and was of very irregular shape, while detached portions of territory belonged to it. Its area was 6,060 sq. m., and its pop. 2,578,000. It was divided into the governments of Kassel and Wiesbaden. In addition to these towns it included Frankfort, Fulda, Homburg, and Marburg. The Lahn and the Falda flowed through it, while the Rhine and the Main were on its borders. It is a hilly district, with many forests and some mining, in addition to agriculture. The province consisted of territories gained by Prussia after the war of 1866. These were Hesse-Kassel, much of Frankfort, Hesse-Homburg, the duchy of Nassau, and other spoils.

Hesse-Rotenburg. A German state that existed from 1627 to 1834. Ernest, a younger son of the landgrave of Hesse-Kassel, received it as a younger son's portion. This he increased, and on his death it was divided into two, one being Hesse-Rotenburg, a small district around Rotenburg, his capital. In 1801 part of the state was taken by France, the landgrave being compensated by other territory. In 1834 the ruling family became extinct, and Hesse-Rotenburg was united with Hesse-Kassel.

Hessian Boot. High boot worn over tight pantaloons and bearing a tassel in front. Named probably from Hesse, in Germany, it was introduced early in the 19th century as a modification of the 18th century top-boot, and worn with outdoor dress it formed for a time part of the dress of English general officers until superseded by the Wellington boot. See Boots and Shoes, colour plate.

Hessian Fly (*Cecidomyia destructor*). Dipterous insect of the gall midge family (*q.v.*). It is a



Hessian Fly. A destructive midge, greatly enlarged

widely spread insect, about $\frac{1}{10}$ in. long, which lays its eggs on cereals and grasses. The larvae live in the stems near ground-level, which weakens the straw so that the crop readily "lodges." The name Hessian Fly was given to it in the U.S.A. where it seems to have been introduced by Hessian troops,

having been carried over as pupae in straw. This pest is serious in America, but rarely so in Britain, where its attacks are spasmodic.

Hestia (Gr., hearth). In Greek mythology, the goddess of the hearth. She was not only a domestic goddess, but in every town and state there was a hearth sacred to Hestia, the fire of which was never allowed to go out. Her Roman counterpart was Vesta.

Heston and Isleworth. Bor. of Middlesex, England, formed of the two parishes of Heston and Isleworth. It stands on the Thames, 12 m. W.S.W. of London by electrified rly. There are dyeworks, breweries, engineering shops, and factories making soap, etc. It forms a borough constituency.



Heston and Isleworth arms

Formerly part of a forest extending from Brentford to Staines, Isleworth (*pron.* Izleworth) is called Gistelesworde in Domesday, and in the 14th century was known as Histelworth. Syon House (*q.v.*), a seat of the duke of Northumberland, is on the site of the monastery of SS. Saviour and Bridget, founded in 1415, in which Queen Catherine Howard was imprisoned in 1541. The 14th century parish church of All Saints was rebuilt in 1705, enlarged in 1865, and, with the exception of its tower, completely destroyed by fire in 1943. John Hall, one of the vicars, was hanged in 1535 for denying the royal supremacy of Henry VIII. Gumley House, Gordon House, and Worton Hall are noteworthy. In 1890 the London international college, 1867, associated with Richard Cobden, became a training college for teachers. Notable residents were the duchess of Kendal, Sir Thomas Ingram, Lord Baltimore (founder of Baltimore in the U.S.A.), R. B. Sheridan, and Sir Joseph Banks. Osterley Park (*q.v.*), in the vicinity, was the seat of the earl of Jersey. Heston airport, opened in 1929, was, until the Second Great War, the principal centre for private flying near London. Pop. (1951) 106,849.

Hesychasts (Gr. *hēsychos*, quiet). Term applied to a school of Quietists among the Greek monks of Mt. Athos in the 14th century. They practised a kind of self-hypnotism by gazing fixedly at their own navels, searching the seat of the soul, and in this condition were supposed to receive spiritual illumination. They held that God

dwells in eternal light; that this light is the vehicle of His activity; and that the light illuminates the souls of those who practise intense abstraction and self-denial. Their teaching gave rise to controversy in the Eastern Church.

Hesychius (5th century A.D.). Alexandrian grammarian. He was the author of a Greek lexicon, which is of great value for its collection of unusual words, and quotations from authors whose works have been lost. Hesychius was a heathen, and the work in its present form contains obvious traces of revision by a Christian scribe or grammarian. The source of the work is the lexicon of Diogenianus (2nd century), itself based upon an earlier one by Pamphilus (1st century). He is not to be confounded with Hesychius of Miletus, probably of the 6th century, author of a universal history from the earliest times down to the death of Anastasius, 518, part of which, dealing with the history of Constantinople, is still extant; and of an *Onomatologos* (list), or biographical dictionary of literary persons and others, much used by Suidas in his lexicon.

Hetairai or **Hetaerae**. Superior class of courtesans in ancient Greece who flourished especially at Athens and Corinth. Accomplished dancers and musicians, many of them were also highly educated. The most famous of them were Aspasia, mistress of Pericles, a woman of high intellectual gifts and great powers of fascination, and Phryne, who sat as a model to Apelles for his great picture of Aphrodite Anadyomenē.

Heterodyne. Phenomenon of radio transmission. The addition of two sinusoidal sound waves of nearly equal frequency leads to the phenomenon, known as beats, of the alternate swelling and lowering of the aggregate sound intensity. It takes place at a frequency equal to the difference of the fundamental frequencies. The corresponding phenomenon resulting from the addition of two alternating electrical quantities of nearly equal frequencies is referred to as heterodyne. In practice this phenomenon is applied in a certain type of radio receiving circuit. This circuit is adjusted to give local continuous oscillations of a frequency nearly equal to those of the radio-wave transmission; modulation results and gives rise to audio signals in telephones suitably connected in the circuit. When the envelope frequency, which is equal to the difference frequency,

is higher than the audio-frequency range, the phenomenon is termed a supersonic heterodyne (superhet). This method of radio reception has many advantages, and its salient feature is that the frequency of the oscillator in the frequency changer is varied, according to the frequency of signal which it is desired to receive, so that the frequency of the output voltage of the frequency changer remains constant. This constant frequency is referred to as the intermediate frequency, and by amplifying at this frequency, say 100 Kc, instead of at radio frequencies a considerable saving in complexity of apparatus and cost is effected.

The heterodyne principle is applied to the measurement of frequency, and the essentials of the apparatus required are a variable frequency electron oscillator of good stability and a sensitive detector amplifier (or a radio-receiving set). The frequency of the calibrated oscillator is varied until zero beat is obtained with the unknown frequency, as indicated by the detector or receiving circuit.

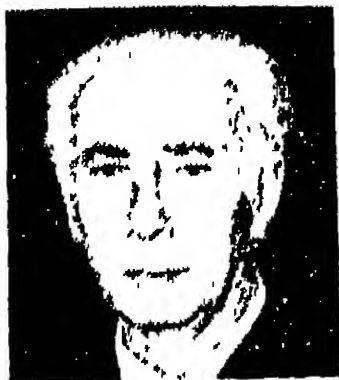
Heteropoda (Gr. *heteros*, other; *pous*, foot). Section of the Gastropoda adapted for free swimming at sea. The foot is modified and flattened laterally to serve the purpose of a fin, and the animal swims with its lower side uppermost. They are met with at the surface of the warmer seas, usually in dense companies. The shell and tissues are transparent, so that the internal organs can be seen; and all the species are carnivorous. They are divided into three families, having respectively a coiled shell, a rudimentary shell, and no shell. See *Gastropoda*.

Heteroptera (Gr. *heteros*, other; *pteron*, wing). Division of the Hemiptera, an order of insects, in which the wings are unlike. The fore-wings are hardened at the base and membranous at the apex, being thus partly elytra, while the hind-wings are wholly membranous. They lie flat on the back, not sloping at an angle to form a kind of roof. Like all the hemiptera, they are provided with a rostrum or beak, and obtain their food by suction. Known as plant bugs and water bugs, they include many families. The common bed bug belongs to this sub-order.

Hetton. Urban district and parish (Hetton-le-Hole) of Durham, England. It is 7 m. S.S.W. of Sunderland. The chief industry is work in the coalmines near by. Pop. (1951) 18,504.

Heulandite. Member of the zeolite (*q.v.*) group of minerals. It is a hydrous silicate of calcium and aluminium, often containing smaller amounts of soda and strontia ($\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 5\text{H}_2\text{O}$). It occurs as white or brown monoclinic crystals, usually associated with other zeolites.

Heuss, THEODOR (b. 1884). First president of the federal republic of W. Germany. Born at



Theodor Heuss,
German president

Brackenheim, Württemberg, Jan. 31, 1884. he studied in Munich and Strasbourg, becoming a disciple of the reformer Naumann, who entrusted Heuss with the editorship of *Die Hilfe*, 1905. In 1912 he took over the Heilbronn daily *Neckarzeitung*. After the First Great War he sat in the Reichstag as a democrat, and became director and lecturer at Berlin political academy. A scathing analysis of the Nazi ideology, *Hitler's Way*, 1932, provoked the immediate dismissal of Heuss when Hitler took power. In retirement he wrote biographies of Naumann and Liebig. Occupying troops in 1945 found Heuss in a Heidelberg attic and made him Württemberg's minister of education. The next year he became professor of history and politics at Stuttgart technical university. At the Bonn assembly he took a decisive part in creating the federal constitution; and was elected president of the new federal Germany. Sept. 12, 1949. *Pron.* hoyss.

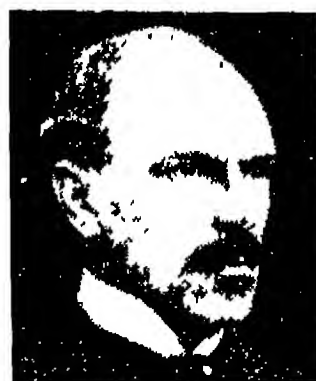
Hevelius, JOHANN (1611-87). A German astronomer. Born at Danzig, Jan. 28, 1611, he became interested in astronomy in 1639 and built his own telescope of 150 ft. focal length. His principal work was on sun-spots, comets, and the lunar surface; but he is chiefly remembered for his catalogue of 1,564 stars and its accompanying atlas, in which he outlined seven new constellations, still used. He died Jan. 28, 1687.

Hever Castle. Castellated mansion near Edenbridge, Kent. In Edward III's time a castle was built here by Sir William de Hevre, and in the 15th century a new one was erected by Sir Geoffrey Boleyn, ancestor of Anne Boleyn who lived here, and whose ghost is said still to haunt the place. Henry VIII afterwards granted it to Anne of Cleves. The castle fell into decay. It was

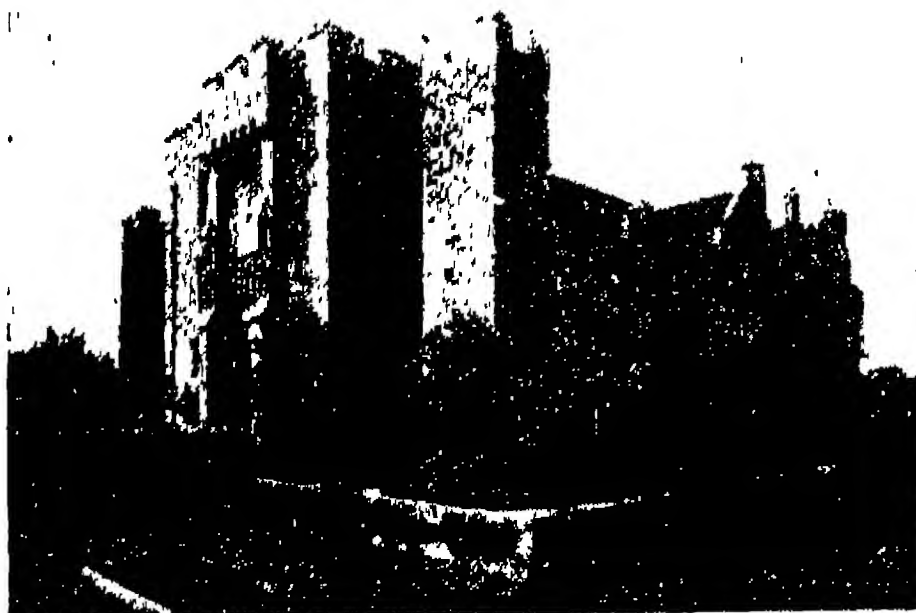
purchased about 1890 and restored by the 1st Viscount Astor.

Hevesy, GEORGE DE (b. 1885). Hungarian chemist and physicist. Born Aug. 1, 1885, he discovered in 1922, in collaboration with the Danish physicist, D. Coster, a new element, hafnium, thereby contributing a decisive proof to Bohr's theory of the structure of the atom. This, and his work on the separation of isotopes as chemical and biological indicators, brought him the 1943 Nobel prize for chemistry.

Hewlett, MAURICE HENRY (1861-1923). British author. Born in London, Jan. 22, 1861, he was called to the bar in 1891, and held a post in the civil service, 1896-1900. He established his reputation in 1898 with *The Forest Lovers*, a romance of the kind of vague medievalism which William Morris had initiated. His other stories include *Little Novels of Italy* (with the dainty Madonna of the Peach Trees), 1899; *Richard Yea and Nay* (*Coeur de Lion*), 1900; *The Stopping Lady*, 1907; *Brazen-*



M. Hewlett
Beresford



Hever Castle, Kent, once the residence of Anne Boleyn.
It was restored by Viscount Astor

head the Great, 1911, and *Mainwaring*, 1921. He also wrote verse, including *Pan and the Young Shepherd*, 1898; and essays, *In a Green Shade*, 1920. He died at Broadchalke, near Salisbury. June 16, 1923.

Hexachord (Gr. *hex*, six; *chorde*, chord). Scale of six notes. It was established by Guido d'Arezzo for the purposes of his teaching of solmisation, thus superseding the Greek system of tetrachords. The term is sometimes used to denote a six-stringed lyre; occasionally, to express the interval of a sixth.

Hexagon. Plane figure having six sides and six angles. A regular hexagon has six angles, each 120° , and six sides each equal to the radius of the circumscribing circle.

Hexahedron. Solid, having six plane faces or surfaces. The regular hexahedron is the cube, all six faces being squares of equal size.

Hexameter (Gr. *hex*, six; *metron*, measure). Metrical line or verse containing six feet, of which the penultimate one must be a dactyl and the final one either a spondee or a trochee. It is the metre of the classical epics, but is not well adapted to the genius of the English language. Longfellow's *Evangeline* is the best known successful hexameter poem in English. Instances of accented hexameters occurring in English prose without intention are not uncommon, *e.g.* *How art thou fallen from heaven, O Lucifer, son of the morning* (Isaiah 14, v. 12).

Hexamine OR UROTROPINE. A compound formed by ammonia and formaldehyde. Chemically it is hexamethylenetetramine. Hexamine is used as a urinary disinfectant, its activity being due to the liberation of formaldehyde in acid urine. Sodium acid phosphate must be given synchronously to ensure an acid urine, as the substance is inactive in the urinary tract in an alkaline medium. Hexamine is also used as a biliary disinfectant, when it acts without the aid of sodium and phosphate, being activated by the presence of bile salts.

Hexapla, THE. Work compiled by Origen (*q.v.*). The term means "six-fold" (neut. pl. of Gr. *hexaplos*), and was suggested by

the plan adopted by Origen to show the divergences between the Septuagint, the later Greek versions, and the current Hebrew text of the O.T.

The compilation of Origen is arranged in six parallel columns. The first contains the Hebrew words; the second a transliteration of the Hebrew words in Greek characters; the third the Greek equivalents in the version of Aquila (*fl.* 128-129), a version intended to be much more literal than that of the Septuagint; the fourth the Greek equivalents in the version of Symmachus (*fl.* c. A.D. 180-192), a

much freer version than that of Aquila; the fifth the Greek equivalents in the Septuagint (*q.v.*); the sixth the Greek equivalents in the version of Theodotion (*fl.* perhaps under Marcus Aurelius), a free revision of the Septuagint.

Hexateuch, THE (Gr. *hex*, six; *teuchos*, volume). The term pentateuch is an ancient designation of the first five books of the Bible (Gr. *pente*, five), which were ascribed to Moses by Jewish and Christian tradition, followed by that of Islam. These books are known collectively to the Jews as the *Torah* (law) and are described by them sectionally as "the five-fifths of the law." The term hexateuch was invented by modern scholars in order to include in the same group a sixth book, the book of Joshua, which is linked closely by its contents and style to the preceding five books, and is based on the same documentary sources.

It is contended that the pentateuch, except in certain sections, does not claim to be the work of Moses. It is a book about Moses, just as the book of Joshua is a book about Joshua. Together with the book of Joshua, it is, in fact, according to most modern scholars, a composite work framed and edited out of materials of varying date (c. 850-400 B.C., though some fragments, *e.g.* the decalogue, may well be much older).

Doubts as to the Mosaic authorship of the pentateuch had already been expressed by such writers as Hobbes (1651), Peyrieris (1654), Spinoza (1671), Le Clerc (1685), and by the French Oratorian, R. Simon (1678), who has been called "the father of O.T. criticism." But criticism proper began with Jean Astruc, a French physician, who in 1753 distinguished two different accounts of the creation in Genesis, (a) Gen. 1, v. 1-2, v. 4a, and (b) Gen. 2, v. 4b-3 end; and that in (a) God is referred to as *Elohim*, while in (b) the personal name *Jehovah* (properly *Yahweh*) is used. Astruc did not deny the Mosaic authorship of the pentateuch, but considered that he could identify various sources used by Moses. His theory, which eventually posited the existence of ten sources, was developed by Eichhorn (1779) and Ilgen (1798) and is known as the earlier documentary hypothesis.

The fragmentary hypothesis of A. Geddes (1800), expanded by Vater (1805), was attacked by de Wette, who insisted on the unity of the pentateuch in its present form, and the next important

development was the supplementary hypothesis of F. Bleek (1822), to which, in a modified form, some scholars still incline. According to this theory, an historical work containing the main part of Genesis, Numbers and Joshua, and including Deut. 34, vv. 1-8, all being the work of the Elohist (the author of the source using *Elohim* in Astruc's theory), was edited and supplemented by a Jehovist writer (the author of the *Jehovah* source). The whole was revised again by the author of Deuteronomy in accordance with the ideas expressed in that book.

The explanation most widely accepted at the present day of how the hexateuch came to take its existing form is the later documentary hypothesis. The development of this began with Hupfeld (1853), who, following a hint of Ilgen, showed that in Genesis there were three strands combined by redactors; of these, two used the word *Elohim*, and one of the Elohist's evidently had a priestly bias. Hupfeld's theory was expanded by Graf (1866), Kuenen (1861; influenced by Bishop Colenso), and Wellhausen (1878), and in its present form assumes the use of four independent documents, combined as follows. A Jehovist work (c. 800 B.C.), derived from Judah and referred to as J, and an Elohist work (c. 750 B.C.), derived from Ephraim (E), circulated independently for a time. Later (some time before 650 B.C.) these two works were combined. The united work, which has been described as the "oldest book in Hebrew history" incorporated (from E) the earliest of the three chief codes of Hebrew law, now known as the book of the covenant. It has no mention of the reform abolishing the "high places" and limiting sacrifice to the temple at Jerusalem. In 620 B.C., during the reign of Josiah, a work almost, but not entirely, identical with Deuteronomy as it is today was discovered, an event which led to the reforms of Josiah recorded in 2 Kings 22 and 23. Soon afterwards, this work, with additions at the beginning and the end, was combined with the other two by redactors. The Deuteronomist strand is known as D, and the formula results:

$$\frac{(J+E)+D}{Rje \quad Rd} = JED$$

There next arose a document containing an ancient body of laws (Lev. 17-26), which stands midway between Deuteronomy and

the priestly legislation noticed by Hupfeld. This is known as the holiness code (H), and was incorporated during the exile in a later priestly work known as P. P was promulgated by Ezra in (probably) 444 B.C., and some time afterwards was combined by redactors with JED to produce the hexateuch in its present form:

$$\text{Hexateuch} = \frac{(J+E)+D+P}{Rje \quad Rd \quad Rp}$$

Although this hypothesis is firmly established and offers a satisfactory explanation of the linguistic and stylistic differences of the various parts of the hexateuch, the question is by no means regarded as closed, especially where the fate of Deuteronomy is concerned, and some scholars are prepared to abandon the hypothesis altogether. There is a tendency to re-examine the criteria of criticism in the light, for example, of archaeology, to recognize the dangers of attempting to allot isolated fragments to one source or another, and to admit that the authors of J and E may have used much older material. Yet no alternative hypothesis has gained a wide acceptance, and this one has the merit of not merely being based on language and style, but of agreeing with the general historical trend, which postulates a gradual but inevitable development from prophet to priest, and then to ritual and law. See Bible; Pentateuch.

* J. E. Padfield

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Hexham. Market town and urban dist. of Northumberland, England. It stands on the S. bank of the Tyne, 20 m. W. of Newcastle, and is on the rly. (N.E. region). The town has ironworks and other industries and a trade in agricultural produce, while in the neighbourhood are coal mines. The chief building is the priory church, a magnificent E. E. building, restored in the 19th century. It was not entirely completed by its builders, the Augustinian canons, the nave being finished only in the 20th century.



Hexham. The Moot Hall, the 15th century tower of the bailiffs of the archbishops of York

There are some remains of the priory of the Augustinian canons, which was dissolved at the Reformation. Other buildings are the grammar school, the 15th century Moot Hall, and the Manor Office, built in 1330. The urban council owns the water supply and the markets. Race meetings are held.

Hexham grew up around the church founded in the 7th century, and at one time had its own bishop. After the Norman Conquest the town and district, called Hexhamshire, was a liberty ruled by the bishop and later by the archbishop of York. It became part of Northumberland in 1572. Viscount Ruffside, as D. Clifton Brown (Speaker 1943-51), sat for Hexham parl. div. 1918-23 and 1924-51. The town now gives its name to a co. constituency. Market day, Tues. Pop. (1951) 9,715.

The battle of Hexham was fought May 15, 1464, between the Lancastrians and the Yorkists. It took place on the Linnels, 3 m. S.E. of the town. Beaten at Hedgeley Moor (*q.v.*), the Lancastrians collected a force and, led by Henry Beaufort, duke of Somerset, came up with the Yorkists under Lord Montagu. The latter were superior in numbers, whereupon the Lancastrians melted away, except about 500, who were soon killed or captured. Somerset was executed.

Hexuronic Acid. Vitamin C. It was first obtained in a pure state from extracts of suprarenal glands and orange juice in 1928 by Szent-Györgyi, though the identity of the substance with Vitamin C was not at first realized. See Ascorbic Acid; Vitamins.

Hexyl OR HEXANITRODIPHENYL-AMINE. Explosive, much used by the Germans, usually in admixture with other explosives as a filling for bombs, mines, and torpedo warheads. It is prepared by the direct initiation of diphenylamine. It is a high melting, yellow powder which turns brown in sunlight, and is poisonous and harmful to the skin. See Explosives.

Heyden, JAN VAN DER (1637-1712). Dutch painter and etcher. He was a native of Gorkum. Most of his pictures are of buildings or ruins in Dutch towns, but he travelled widely on the Continent and in England, painting wherever he went. Lingelbach, Adriaan van de Velde, and Egdon van der Neer frequently painted the figures in van der Heyden's works. He died at Amsterdam, Sept. 28, 1712.

Heydrich, REINHARD (1904-42). German Nazi police officer. He was born at Halle, Germany, on March 7, 1904. As a youth he joined a terrorist organization which aimed at the overthrow of the Weimar republic. Entering the navy 1922, he rose to the rank of lieutenant, but was compelled to resign, 1931, on account of his private immorality. He joined the Nazi party 1932, becoming Himmler's adjutant. Made chief of the Munich police, 1933, he participated in the "liquidation" of the Roehm group, and was appointed, 1935, chief of the security police, including the Gestapo, running with Himmler the concentration camps and German world espionage.



Reinhard Heydrich, Nazi police officer

After Heydrich had attempted by terror and mass murder to break the resistance movements in Norway and the Netherlands, he was made deputy-protector of Bohemia and Moravia, Sept., 1941. He immediately had some 250 Czechs killed and hundreds of others arrested. A bomb was thrown and shots were fired at him in a suburb of Prague, May 26, 1942, as a result of which he died June 3. The village of Lidice (*q.v.*) was obliterated, and its inhabitants, who were accused of harbouring his assassins, were murdered or carried off to Germany.

Heye Foundation. Museum of the American Indian in New York. It was established in 1920 by Dr. George G. Heye to

gather and preserve for students everything useful in elucidating and illustrating the ethnology of the aborigines of the western hemisphere. The museum, in 155th St., was completed in 1922, the site and £70,000 towards its construction having been given by A. M. Huntington, a New York businessman. It has more than 2,000,000 exhibits, together with laboratories and study rooms for the use of students, and issues monographs and other publications relative to its researches. The library contains some 25,000 volumes and complete issues of all relevant periodical publications.

Heymans, CAMILLE (b. 1892). Belgian professor of pharmacology. Born March 28, 1892, at Ghent, he studied there, at Paris, Lausanne, Vienna, and at Cleveland, Ohio. He became an M.D. and a lecturer at Ghent in 1923, fellow of the Belgian-American educational foundation 1927, and professor of pharmacology 1930. After lecturing in U.S. universities in 1937, chiefly on his research into pharmacodynamics, he was awarded the Nobel Prize for medicine in 1938 for his discoveries concerning the influence of sinus and aorta mechanism in breathing. He was a member of many learned societies, and winner of Belgian, French, and other prizes. During the Second Great War he was head of the medical department of the Allied relief committee.

Heyse, PAUL JOHANN LUDWIG (1830-1914). A German novelist, poet, and dramatist. He was born at Berlin, March 15, 1830, and educated at Bonn university. After some travelling about Italy, which he frequently re-visited, he was summoned by Maximilian of Bavaria, whose attention



Paul Heyse, German writer

he had attracted by his epic poems, to Munich, where he spent the rest of his life. His best work is seen in his short stories and longer novels on social and religious questions, the best of these being *L'Arrabbiata* (Eng. trans. 1867), *Children of the World* (Eng. trans. 1882), *In Paradise*, and *Merlin*.

His dramas, though they reach a high standard of literary excellence, were unsuited for the stage; Hans Lange, Kolberg, and Mary of

Magdala, however, enjoyed a certain amount of success. His work shows the influence of his intimate acquaintance with Italy and its people. Heyse was awarded the Nobel prize for literature, 1910. He died at Munich April 2, 1914. Consult his autobiography, *Youthful Reminiscences and Confessions*, 1901-12.

Heysham. Formerly an urban dist. of Lancashire, England, now part of the bor. of Morecambe and Heysham. The railway station is alongside the British Rlys. harbour, with steamship service to N. Ireland and the Isle of Man. See Morecambe and Heysham.

Heythrop. Village of Oxfordshire, England. It is 3 m. N.E. of Chipping Norton, and gives its name to a pack of foxhounds that hunt this part of the county. Heythrop House was long the residence of Albert Brassey (1844-1918), master of the pack for over forty years from 1873. In the vicinity are the Rollright Stones, forming an ancient stone circle.

Heywood. Borough of Lancashire, England, 8 m. N. of Manchester. It has extensive cotton and woollen factories, other industries including engineering and paper making. The municipality owns the markets and baths. There are three recreation grounds, a garden of remembrance, a free library; an art gallery and museum, the gift of Thomas Kay of Stockport, is used as part of the grammar school. Queen's Park was presented to the town by Queen Victoria. Market days Fri. and Sat. Pop. (1951) 25,201.

Heywood and Royton is the name of a county constituency.

Heywood, JOHN (c. 1497-1580). English epigrammatist and writer of interludes. A Roman Catholic friend of More, he is believed to have been at Oxford, and was a favourite of Henry VIII and Queen Mary. His Proverbs on marriage proved a rich quarry for the Elizabethan dramatists. The Four Ps is his best interlude. Consult complete works, ed. J. S. Farmer, 1905-06; *Life and Works of John Heywood*, R. Bolwell, 1922.

Heywood, THOMAS (d. c. 1650). English actor and dramatist. He is supposed to have been born in Lincolnshire about 1575 and educated at Peterhouse, Cambridge. In 1598 he became an actor in Henslowe's company and, after the accession of James I, a member of the queen's company of players. About 1596 he wrote his first play, *The Four Prentices*

of London (printed 1615), and in 1633, in a prefatory address to *The Traveller*, he claimed to have had "either an entire hand, or at the least a main finger" in 220 plays. Of these pieces only 35 are known to exist.

He attempted every kind of drama, and also wrote pageants, four of which are still extant, poems, translations, and various prose works, including *An Apology for the Lord Mayor*, 1631-39; *Several Actors*, 1612; *Nine Books of Women*, 1624; and *A Life of Queen Elizabeth*, 1631. Of his plays, *Edward IV*, 1600, and *A Woman Killed With Kindness*, 1603, are perhaps the best examples; the first a "chronicle history," the second a drama of domestic sentiment. A collection of his extant plays was published, 6 vols. 1874, and a selection from them, ed. J. A. Symonds, in the *Mermaid Series*, 1903. Consult *Select Plays*, ed. J. A. Symonds and A. W. Verity, 1888; *Thomas Heywood*, A. M. Clarke, 1931.

Hezekiah. King of Judah (2 Kings 16, 18-20; 2 Chron. 29-30). He succeeded his father, Ahaz, at the age of 25, and was a notable reformer, who abolished the centre of idolatrous worship and destroyed the brazen serpent of Moses, which at this time seems to have been regarded as a kind of idol. He also cleansed the Temple and restored the worship of Jehovah. For a time he continued the tributary alliance with Assyria, but later repudiated it and had to face two invasions under Sennacherib. The first of these was partly successful, but in the second Hezekiah completely routed his foes. He was a man of considerable literary and poetic gifts, and is regarded by the Jews as one of their most famous monarchs.

Hiawatha. One of the many names of a traditional personage of miraculous birth. Various tribes of the N. American Indians believed he had been sent to teach them the arts of peace.

Hiawatha. THE SONG OF. Epic poem by H. W. Longfellow, 1855, embodying the legends and traditions of the N. American Indians. Taking as model for his verse form the unrhymed Finnish epic *The Kalevala*, the poet gave the story of Hiawatha from his wondrous birth to his final passing "To the land of the Hereafter," and embodied in it much of Indian lore. Written in unrhymed trochaic tetrameters, the novelty of its form provoked

much criticism, and was a ready target for parody (cf. Lewis Carroll's *Hiawatha's Photography*) but the poem is now not unjustly regarded as Longfellow's greatest achievement.

Samuel Coleridge-Taylor, while still a student at the Royal College of Music, wrote *Hiawatha's Wedding Feast*, the first part of a trilogy, 1898; the second part, *The Death of Minnehaha*, was performed at the Staffordshire festival, 1899, and *Hiawatha's Departure* was produced a year later by the Royal Choral Society at the Royal Albert Hall. This work brought lasting fame to the composer throughout the English-speaking world.

Hibbert Trust. THE. Trust founded under the will of Robert Hibbert (1770-1849). The income arising from the funds is applied in such manner as the trustees deem conducive to the spread of Christianity in its simplest form, and to the exercise of private judgement in religion. The Hibbert lectures are delivered under the auspices of the Trust. The Hibbert Journal was founded in 1902 with its support. Scholarships for post-graduate study are awarded to suitable students for the ministry. The office of the Trust is at 14, Gordon Square, London, W.C.

Hibbing. Village of Minnesota, U.S.A. The largest municipality on the Mesabi, Vermilion, and Cuyuna iron ranges, it stands on the Duluth R., 82 m. N.W. of Duluth, in St. Louis co., and is served by rlys. Settled in 1892 and incorporated as a town the next year, it was a lumber centre until iron ore was discovered in the streets. A company bought the land on which the village stood, and in 1919 the community was literally removed one mile S. On the deserted site developed the world's largest open-pit mine, which yielded 17,000,000 gross tons of iron ore in 1940, all Hibbing producing 46,000,000 tons. Hibbing has retained the village form of government to preserve its very lucrative tax revenue. Pop. (1950) 16,276.

Hibernation (Lat. *hibernare*, to pass the winter). Dormant or torpid condition in which many animals and plants pass the winter. For animals it may be continuous or intermittent. It is caused not so much by cold as by the lack of food which cold produces. The absence of foliage obliges large numbers of insects and molluscs to pass the winter in a torpid state. This necessitates for the

insectivorous birds migration in autumn to warmer countries where food is plentiful.

This expedient is not available for the mammals and reptiles, so after laying up a store of fat in their tissues, they retire into winter quarters and fall asleep. The British bats, which are entirely insectivorous, retire to caves, hollow trees, and the roofs of dwellings; but some are sensitive to a rising of outdoor temperature, and come out for an occasional winter flight and feast upon the insects that have also been awakened. Some species, like the squirrel and dormouse, provide for such intervals by laying up secret caches of nuts and grain to which they can resort, afterwards resuming their sleep. During this period the body temperature falls, the pulse is reduced, respiration is feeble, and other functions are largely suspended. Frogs bury themselves in the mud at the bottom of ponds; toads, newts, and snakes retire to holes in the ground.

Among insects hibernation is almost general where the food is vegetation, and it may be passed in any stage of the life cycle—as egg, larva, pupa, or perfect insect. Familiar butterflies like the brimstone and the small tortoiseshell frequently occasion newspaper paragraphs by appearing on the wing during some genial sunny interval in midwinter, but these are only hibernating females awakened by a rise in temperature.

Hibernation is quite common among plants, the dormancy (*q.v.*) of many bulbs and underground rhizomes representing the hibernating condition. The behaviour of frogbit (*q.v.*) and other floating plants which withdraw all their substance into winter-buds which sink to the bottom mud is also hibernation; but there are similar phases of inactivity in plants which must be differentiated.

Hibernia OR **IVERNIA**. Name given to Ireland by Latin writers. Aristotle spoke of it as *Ierne*, and Latin authors evolved the form *Hibernia*. See *Ireland*.

Hibernians, ANCIENT ORDER OF. Society composed of Catholic Irishmen, organized on benefit lines. It is said to have been founded by Rory O'More in the 17th century under the name of the Defenders. After Catholic Emancipation in 1829, the society was remodelled and its operations were extended to Great Britain, as well as to N. America, Australia, and elsewhere. Members must be of Irish birth and profess the R.C. religion.

Hiccup. Convulsive act produced by spasmodic contraction and descent of the diaphragm, the large horizontal muscle which separates the cavity of the chest from the abdomen. It is frequently due to over-distension of the stomach, and is sometimes a symptom in more serious diseases such as peritonitis, cancer of the stomach, and typhoid fever. It may arise from hysteria or epilepsy. Hiccup can generally be stopped by holding the breath for a minute, though severe cases demand removal of the cause.

Hichens, ROBERT SMYTHE (1864–1950). British novelist. Born at Speldhurst, Kent, Nov. 14,



Robert Hichens
Russell

1864, he was educated at Clifton, and abandoned a musical career for literature. The *Green Carnation*, published anonymously in 1894 (re-issued with his name in 1949), attracted attention; and he achieved a best-seller, *The Garden of Allah*, 1905, a study of the clash between religion and passion in the Orient. Other novels included *Bella Donna*, 1909; *The God Within Him*, 1926; *The Paradine Case*, 1933; *Harps in the Wind*, 1945. *Memoirs, Yesterday*, appeared in 1947. He wrote plays, *e.g.* *The Real Woman*, 1909, and dramatised his own *Bella Donna* and *The Garden of Allah*. He died at Zürich, July 29, 1950.

Hickory (*Carya*). A genus of trees of the family Juglandaceae, natives of N. America. The leaves are large, divided into oblong leaflets arranged feather-fashion, like those of the nearly related walnut trees. The flowers, which are without petals, are male or female; the males in hanging catkins, the females in a short spike at the end of the new shoots. The husk of the large fruit splits into four segments, revealing the thin-shelled nut. The timber is hard and tough. *C. illinoensis* is the pecan, whose delicious olive-shaped nuts are a favourite fruit. *C. ovata*, shell-bark or shag-bark, produces the principal hickory-nut of the markets. *C. laciniosa* is the big shell-bark or king-nut; *C. alba*

the mocker-nut; *C. aquatica* the bitter pecan, and *C. glabra* the pignut or broom hickory.

The shell-bark was introduced into Great Britain in 1629. Hickory trees thrive best if grown as specimen trees in any ordinary soil on lawns or the borders of woodlands, and may be planted in either autumn or spring. When pruning takes place in Nov. the thinnings of the hickory are particularly valuable, if preserved and dried, for use as walking-sticks.

Hicks, SIR (EDWARD) SEYMOUR (1871–1949). British actor and playwright. Born at St. Helier, Jersey, Jan. 30, 1871, he first appeared on the stage at Islington in 1887. Engaged by the Kendals, he toured with them in England and the U.S.A., 1889–91. He was principal light comedian in musical comedies at the Gaiety, 1893–98. He built the Aldwych Theatre, which he opened 1905 with his play for children, *Bluebell in Fairyland*, and, 1906, opened the Hicks (later Globe) Theatre with his musical piece, *The Beauty of Bath*.

Hicks wrote and produced some 66 plays, mostly comedies, appearing in sev-

eral; they included *The Gay Gordons*, *The Catch of the Season*, *This World of Ours*, *Vintage Wine* (with A. Dukes); and among adaptations, *Sleeping Partners*, *The Man in Dress*

Clothes, *The Miracle Man*. He assumed management of the Prince's Theatre, 1916; *Daly's*, 1934; *Victoria Palace*, 1935. In a film, 1935, he was a fine Scrooge. He took the first concert party to France in 1914, and during the Second Great War was chairman of *Ensa (q.v.)*. He married Ellaline Terriss in 1902, was knighted 1935, and died April 6, 1949. Among his books of reminiscences was *Me and My Missus*, 1939.



Sir Seymour Hicks,
British actor
and playwright

Hicks, WILLIAM (1830–83). British soldier, commonly known as Hicks Pasha. He joined the Indian Army in 1849, served throughout the Indian Mutiny, and acted as brigade major in the Abyssinian campaign of 1867–68. Retiring as hon. col. from the British



Hickory. Leaves and nuts
of the N. American tree

army in 1880, Hicks was appointed in 1883 to the command of the Egyptian expedition against the Mahdi. The

forces of the latter were signally defeated near Jebel 'Ayn on April 29, and Hicks pushed forward up the White Nile to Duem, whence he branched off across the desert to El 'Obeid. Betrayed by their guide, the Egyptian force fell into an ambushade at Kashgiland, after defending themselves bravely for three days till their ammunition gave out, were virtually annihilated. Hicks fell, Nov. 5, 1883.



William Hicks,
British soldier

Hicksites. Unofficial name for a section of the Society of Friends in the U.S.A. which broke away from the parent body in 1827-28. Elias Hicks was a Long Island farmer who had travelled through the U.S.A. and Canada on preaching tours. He stressed the importance of individual belief guided by the "inner light," thus limiting the authority in doctrine given to the elders by more conservative Quakers. At the time of disruption the Orthodox Friends and the Hicksites were about equal in numbers, but later the former outnumbered the dissentients.

Hidalgo (Span. *hijo de algo*, son of something). Spanish title. It was formerly used of a member of the lower nobility, but now seldom denotes more than gentle birth. The Portuguese form is *fidalgo*.

Hidalgo. Minor planet remarkable for the size of its orbit (mean distance from the sun 5.8 times that of the earth), long period (14 years), large orbital inclination (43° to the ecliptic), and eccentricity (0.65). At its maximum distance from the sun it is as far out as Saturn, but at perihelion it comes close to the orbit of Mars. Perturbations caused by Jupiter may account for the extraordinary orbit. See Asteroids.

Hidalgo. Central inland state of Mexico. It covers an area of 8,067 sq. m. and forms part of the great central plateau. It rises in places to 10,500 ft., but the S. and S.W. portions contain many fertile valleys. The chief agricultural products are cereals, coffee, sugarcane, tobacco, and cotton, and the agave is also cultivated for the production of pulque, the national drink. Mining is an important industry, most of the Mexican silver coming from this state, and

iron ore being worked. Pachuca is the capital. Pop. (1950) 850,394.

Hidatsa. American Indian people occupying the parkland country along the Missouri river. They practised a mixed economy, hunting bison in winter and cultivating maize and squash in summer, and are one of the few groups of eastern peoples whose aboriginal cultivating methods survived long enough for them to be studied by European observers.

Hide. Anglo-Saxon measure of land. There has been much discussion about its size, the estimates ranging from 30 to 120 acres. It began as the amount of land necessary to support a single household, which was probably the labour of eight oxen for 120 days in the year. After a time it was regarded as consisting of 120 acres, not necessarily acres of 4,840 yards, but smaller ones. In each hide were four virgates.

At the time of the Norman Conquest the hide was primarily a unit of assessment, not a measure, and this is why it figures so regularly in

Hide. Term used for the skin of an animal. Any skin is a hide, but, commercially, hide is used for the undressed skins of oxen, horses, and other large animals, those of goats, calves, and sheep being known as skins. In the form of leather hides are used for many purposes. See Leather; Tanning.

Hieraconpolis. Greek name of the ancient city Nekhen at Kom el-Ahmar, Upper Egypt. Situated near the left bank of the Nile, 44 m. above Luxor, it was the residence of the predynastic kings of the S., and sacred to the hawk-headed god Horus. Quibell's excavations, 1897-98, yielded superb examples of early art, including a mace-head and palette of Narmer, a red-gold hawk's head, and copper statues of Pepy I.

Hierapolis. Ancient city of Phrygia, Asia Minor (mod. Pam-buk, Kale). Near the Macander, above the Lycus valley, it was famed for the worship of the goddess Cybele, for its hot springs, and its dyeing industry. It is not to be confounded with Hierapolis (mod.



Hierapolis. Part of the ruins of this ancient Phrygian city

Domesday, where the holdings are given in hides. Taxes were paid on the number of hides, which had little relation to the size of the holding. The tax, generally one of 2s. per hide, was known as hidage, but afterwards as carucage.

The hide was also used in Anglo-Saxon times to express a man's social standing or the value of his oath, while the unit of five hides occupied an important place in the military system of early England. In the Danish parts of England the carucate took the place of the hide. It should be said that the evidence is very conflicting, and that there were doubtless small hides of 30 acres. See Domesday Book; consult Domesday Book and Beyond, F. W. Maitland, 1897; Feudal England, J. H. Round, 1909.

Mambej), 50 m. N.E. of Aleppo, called Bambycē by the Syrians, noted for its temple to Atargatis.

Hierarchy (Gr. *hieros*, sacred; *archein*, to govern). Literally, administration of sacred things. The term was first used by the 6th century writer known as Dionysius the Aeropagite, in his treatise On the Heavenly and Ecclesiastical Hierarchies. By the celestial hierarchy is meant the angels, archangels, and all the company of heaven (as in the Hymn of Praise in the Communion Service). The Jewish hierarchy included the high priest, priest, and Levite. In the Christian Church the term means the presiding officers. It is used also of any body of officials organized in ranks and orders, to define priestly government, and of classification in biology and logic.

Hieratic (Gr. *hieratikos*, sacred, sacerdotal). Cursive script used by the priestly scribes in ancient Egypt. It was a simplified and conventionalised form of hieroglyphic, normally written from right to left in black, often with rubrics. Traceable from the 1st dynasty to the 4th century A.D., notable examples are the XIIth dynasty Prisse and the XIXth dynasty Harris papyri. Theban tombs of the New Empire have yielded wood coffins, limestone slabs, ostraka, and stuccoed boards bearing this script. Long regarded as the parent of the Phoenician alphabet, it is now considered to have played a minor part, if any, in that invention. See illus. in p. 2963.

Hiero I (Gr. Hieron). Tyrant of Syracuse, 478-467 B.C. His great exploit was a decisive naval victory over the Etruscans near Cumae in 474. An Etruscan helmet, with its dedicatory inscription, consecrated to Apollo, is preserved in the British Museum. Hiero was a generous patron of art and literature, among the notable men who resided at his court under his patronage being Aeschylus, Pindar, Bacchylides, and Simonides.

Hiero II. King of Syracuse, 270-216 B.C. He first distinguished himself in the wars against Pyrrhus (q.v.), and being made a general by the Syracusans eventually received the kingship. In the war between Rome and Carthage, Hiero at first












Hiero II
From a coin

sided with Carthage, the Romans having entered into an alliance with the Mamertines, who had seized Messina. After the defeat of the Carthaginians and Syracusans in 263, Hiero made peace, and remained the friend and ally of the Romans. He did much to improve the finances of the country, and certain laws relating to agriculture and the corn supplies called *leges Hieronicae* are mentioned by Cicero as still existing in his day.





Hieroglyphs. Literally sacred sculptures, the name given by the Greeks to the picture-writing of the ancient Egyptians, whether graven or painted. The term is nowadays applied also to other ancient or primitive systems of pictographic writing such as the Minoan, the Hittite, and the Aztec, in which the pictorial form of the signs was retained, and did not


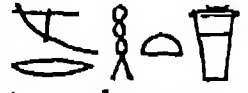

(as did, for instance, Sumerian cuneiform and Chinese characters) undergo alteration into linear or cursive forms. The development of a hieroglyphic system of written communication from its earliest and simplest form in which objects are represented in single or plural number, to a more complicated writing in which abstract ideas, inflexions, moods, and tenses can be expressed, is best seen in the ancient language of Egypt.























EGYPTIAN HIEROGLYPHS. Early picture-signs are found on objects dating from the predynastic period: they probably represent the first stage in the evolution of the script. Names were already written as a kind of rebus or pictorial pun. The pictograms soon became stylised into one particular form:

thus  represents hill,  plough,  wall,  heart; , face, is always drawn front-face, but , head, always in profile. These conventionalised picture-signs are called ideograms (from Gk. *idea*, form, shape, and *gramma*, writing). Some ideograms were used quasi-symbolically, e.g. , the flag-pole before a temple, came to represent god; the human arm grasping a weapon , strength, force;  the ear, hearing.

By an extension of use, an ideogram might be drawn to represent another word with identical or similar sound, so that even abstract ideas, incapable of depiction, could be expressed in writing.

 *kh.p.r.*, the beetle, stood also for the stem *khpr*, to be;  'ankh the sandal strap, for 'ankh, life; and both *mr* , the hoe, and *mr* , canal, could be written for the verb *mr(y)*, to love. The sign, from being a pure ideogram, thus becomes a phonogram, or sound writing. Some phonograms consisted of one consonant only, others of two or three. The uniliteral ones are sometimes called alphabetic; there is a complete set of 25 of these signs, representing every consonant used in ancient Egyptian speech (as in the Semitic languages generally, vowels were not written, and the pronunciation of the language is therefore imperfectly known). Several phonograms

could be combined to make a polysyllabic word, e.g.  (n+t+k), thou;  (mr(+r)+h+t), unguent;  (ms+kh+tiw) = *mesekhtiu*, adze.


In the second and third examples an extra, unsounded sign was added to define or classify the word: this is the so-called determinative.  was added to words for substances similar to ointments which were contained in small stone pots;  is a picture of the adze itself—in Old Kingdom Egyptian the simple ideogram alone might have been used. A considerable number of determinatives was used in writing. They served to clarify the meaning and to make reading easier. For instance,  was added to words connected with the earth or land,  for water,  or  for words denoting actions,  for thoughts or speech, and  (the papyrus roll tied with string) for words denoting abstract ideas. Thus  or  might read *mr*, canal; , *mr*, was a pyramid;  or  could be *mr(y)*, to love; and  denoted the feminine abstract noun *mr(w)t*, love. Other common determinatives were  for male names,  for female names;  (a skin with tail) for animals,  (legs walking) for motion, such as go, run;  a folded cloth, for clothes and textiles;  the disk of the sun, for words connected with light or time;  for the names of towns; and  for names of foreign countries.

A cursive form of hieroglyphic writing, written in ink on papyrus or sherds, was called hieratic (q.v.), and a still more abbreviated form became the later script of everyday life (see Demotic). The pictorial nature of the hieroglyphs,

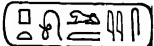
which were often sculptured or painted in great detail, made them eminently suitable for the adornment of monuments such as the façade of a tomb or temple, in the design of which they play an integral part. Since the signs can read from left to right, or from right to left, or even vertically, they could be symmetrically used in antithetical scenes.

Although the uniliteral (one-consonant) sounds are in fact equivalent to the letters of an alphabet, the Egyptians never took the next logical step, that of discarding all the other signs and using only the basic 25—that is, of inventing an alphabet. Hieroglyphs were “divine letters” closely associated with religious belief, and priestly conservatism forbade experiment. The old clumsy system, with its more than 400 signs, continued to be graven on monuments and painted in tombs till the early centuries of the Christian era when the Egyptians, converted to Christianity, abandoned old beliefs and turned (to the schoolboys’ undoubted relief) to the simple Coptic alphabet based on Greek.




Knowledge of the hieroglyphs was lost, and subsequent attempts at decipherment were based only on the inaccurate information contained in the late Greek writer Horapollo’s book *Hieroglyphica*, until at the beginning of the 19th century Thomas Young (1773–1829) and J. F. Champollion (*q.v.*), starting from the surmise of Zoega

(1755–1809) that an oval ,

the so-called cartouche, always contained a royal name, began to assign correct values to various signs. The starting point of their work was the inscriptions on a monument known as the Rosetta stone (*q.v.*) which contains a Greek, a hieroglyphic, and a demotic version of a Ptolemaic edict. Assuming correctly that the two groups of signs in the car-

touches  and



stood for Ptolemaios and Kleopatra, both decipherers went on to assign basic values p for , t for α , o or u for , l for , and so on. By examining the variant forms of these and other names (*e.g.* Berenike, Alexandros, Autokrator, etc.) in cartouches,

Champollion went on to identify other uniliteral signs, and then to decipher the ideograms and phonograms in earlier royal names, *e.g.*



Ramessu
(Ramesses)



Tuthmosis
(Thothmes)

By September, 1822, Champollion could claim to have identified most of the commoner hieroglyphs, and in 1825 he translated the first Egyptian texts. His successors Birch, de Rougé, Brugsch, and others carried on the work of decipherment and in the late 19th century Adolf Erman produced his great Egyptian grammar and began with H. Grapow to edit the Berlin dictionary.

THE MEROTTIC SCRIPT. With its repository of 23 hieroglyphic signs based on those of ancient Egypt, this script was deciphered by F. Ll. Griffith (*q.v.*) during 1910–30.

HITTITE HIEROGLYPHS. The Hittites of the 2nd millennium B.C. used a cuneiform writing on tablets, borrowed from Babylonia, but they used also a hieroglyphic system on monuments and seals, and this survived in use in the later, neo-Hittite or Syro-Hittite kingdoms (10th to 8th centuries B.C.). The system resembled the Egyptian in the use of ideograms and phonograms, and of determinatives placed sometimes before and sometimes after a word. A few signs are similar to Egyptian hieroglyphs, but many have lost their pictorial quality and become stylised, and cursive forms occur which belong probably to an everyday or demotic script on perishable materials. Hittite phonograms contain vowels as well as consonants. There are about 220 signs, 56 phonetic and the rest ideographic. The inscriptions are sometimes written “boustrophedon,” or “as a (ploughing) ox turns,” that is to say, from left to right in one line, and back from right to left in the next.

The first serious attempt at deciphering Hittite hieroglyphs came from A. H. Sayce (*q.v.*), working on a short bilingual known as the *Tarkondemos bulla*. B. Hrozný was the first to identify the language as Indo-European. Sir Arthur Cowley (1861–1931) made progress on the Caracemish inscriptions published in 1914, and his work was continued by Piero Meriggi, Emil Forrer, I. J. Gelb, H. Th. Bossert, and others. In 1934 some 100 bilingual seals (cuneiform and hieroglyphic) were found at Boghazköi, and in 1940

Bossert at Karatepe (*q.v.*) found gateways inscribed with a long bilingual Hittite and Phoenician text which greatly furthered decipherment of the hieroglyphs.

CRETAN HIEROGLYPHS. Possible connexions have been suggested between the Hittite hieroglyphs and those of Minoan Crete. Some 140 signs in picture writing occur on seals from Knossos (Knossos), as well as tablets containing linear signs which may have developed from the hieroglyphs. The later linear script has, in the opinion of most scholars, been read as an early form of Greek, but the hieroglyphs, in the absence of any long text or bilingual, still await decipherment, and the language they represent is unknown.

Bibliography. The Rosetta Stone, E. A. W. Budge, 1929; Egyptian Grammar, A. H. Gardiner, 3rd. ed., 1957; Die Hethitische Bilderschrift, E. Forrer, 1932; Scripta Minora I, A. J. Evans, 1909.

Hierro or **Ferro** (Span., iron). South-westernmost and smallest of the Canary Islands in the Atlantic, belonging to Spain, anciently supposed to be the most westerly land. Of volcanic origin, it is well wooded and mountainous, reaching 4,640 ft. Fresh water is lacking, but a small breed of sheep is reared, and wine, fruit, honey, and brandy are produced. The meridian of Hierro has been used by Continental cartographers as a basis for their maps from the time of Louis XIII. The capital is Valverde. Pop. (1950) 8,182.

Higdon, RANULF (d. c. 1363). English chronicler, a Benedictine monk of St. Werburg's, Chester, where he spent 64 years of his life. His *Polychronicon*, a history of the world from its beginning down to the death of Edward III, was printed, in an English version by John Trevisa, by Caxton in 1482.

Higginson, SIR GEORGE WENTWORTH ALEXANDER (1826–1927). British soldier. Born June 21, 1826, he went from Eton into the Grenadier Guards in 1845, serving in the Crimean War. He commanded the brigade of Guards and the home district 1879–84, and retired as general in 1893. At the age of 100 he shared with the duke of Connaught the unveiling of the Guards Memorial. He was knighted 1889, published an autobiography 1916, and died Feb. 1, 1927.

Higginson, THOMAS WENTWORTH (1823–1911). American author. Born at Cambridge, Mass., Dec. 22, 1823, and educated at Harvard, he was ordained in 1847, and became Unitarian pastor at

Newburyport and Worcester, 1850-58. During the civil war he was colonel of the first regiment of freed slaves, and was wounded at Wiltown Bluff, 1863. He took an active interest in anti-slavery, educational, and women's suffrage movements. A man of striking personality, he wrote with charm and distinction the *Lives of Margaret Fuller*, *Marchioness Ossoli*, 1884; *Henry Longfellow*, 1903; and *J. L. Whittier*, 1903; two histories of the U.S.A., one for the young, 1875, and 1885; and books of essays and reminiscences, his works being issued in 7 vols., 1900. He died May 9, 1911.

High, THE. Familiar name for the High Street of Oxford, one of the most renowned thoroughfares in England. Similar Oxford terms are the Broad, the Turl, and the Corn (Cornmarket St.). It stretches from Magdalen Bridge (E.) to Carfax (W.), and contains buildings of Magdalen, University, Queen's, All Souls, and Brasenose Colleges, also the examination schools and the church of S. Mary.

Higham Ferrers. Mun. bor. and market town of Northants, England. It stands on the Nene, 5 m. E. of Wellingborough and 63 m. N.N.W. of London, and has a rly. station. Making footwear is the chief industry. The church of S. Mary is a fine old building, mainly 14th cent. The buildings erected by the Archbishop Chichele about 1420 include the school house in the Perpendicular style, and the Bede House. The archbishop founded a college here, now scheduled as an ancient monument. Higham was on the lands of the Ferrers family in the Middle Ages. It had a castle and became a corporate town in the 13th century. It retains its mayor and corporation. Pop. (1951) 3,679.

High Bailiff. Official of an English county court appointed by the lord chancellor. The office is now held by the registrar of the court. See Bailiff.

Highbury. District of N. London. It is in the bor. of Islington, and is served by London Transport and British Rlys. Near the station are Highbury Fields, 27½ acres, acquired for the public in 1885. The original manor house

was destroyed in the Wat Tyler rising of 1381. A later building on the site was Highbury Farm, in connexion with which grew up a cake-and-ale-house; an extensive barn which was added to the premises was pulled down in 1861, another being erected. Also added were a dancing platform, theatre, and tea and pleasure gardens, which disappeared by 1871.



Highbury Barn as it appeared in 1792

To the N. is the ground of Arsenal F.C., to the E. of which is Highbury Vale. The Nonconformist club known as the Highbury Society held its meetings at Highbury Barn, 1740-1833. Joseph Chamberlain, when a boy, lived at No. 25, Highbury Place. The manor, mentioned in Domesday, belonged in turn to Thomas, Lord Cromwell; Queen Mary; Henry, son of James I; and Charles I, who in 1629 sold it to Sir Allen Apsley.

High Commission, COURT OF. English ecclesiastical court. It was set up in 1559 to enforce greater uniformity in the services of the Church of England. Whitgift, archbishop of Canterbury, persuaded Elizabeth to delegate her powers of jurisdiction over the church to a commission of 44 persons of whom 12 were bishops. This was done on the strength of an Act of 1558 by which the ancient jurisdiction of the state, ecclesiastical and spiritual, was restored to the crown. The method of action was to request a suspected person to take an oath denying some particular proposition. The court was abolished by an act of July 5, 1641.

High Commissioner. Within the British Commonwealth of nations, including Southern Rhodesia, this title is usually given to the chief representative of the government of one member in the territory of another member; in 1948 these officials were given ambassadorial status and the style excellency. It was also the title of the officer administering the gov-

ernment of Palestine, during the exercise of the British mandate. Within the British colonial empire it is held by the officer administering Basutoland, Bechuanaland, and Swaziland; also by the officer administering the Western Pacific Islands. Lord Milner in South Africa and Lords Cromer and Lloyd in Egypt held the same title.

High Court of Justice. English court of law, a branch of the supreme court of judicature, as established in 1873. It is divided into three divisions; chancery; queen's bench; and probate, divorce, and admiralty; in addition one of its judges is detailed to preside over a court of bankruptcy, and another to deal with the winding-up of companies, both as part of the chancery division.

By the Judicature Act of 1873 every division of the high court has power to try anything that any other division may: thus, a chancery judge could try a divorce or probate suit or an action for libel. In fact, actions of a mixed common law and equity character are tried daily, but to secure the service of expert judges certain matters are started in specific divisions.

Thus common law actions for damages, for the recovery of debts, etc., should be commenced in the king's bench; actions for administration of trusts, specific performance of contracts, and for injunctions to restrain injuries to rights of property, e.g. copyright, rights of light, etc., should be brought in the chancery division; while in the probate, divorce, and admiralty division should begin those suits which the title of the division indicates. Each division of the court has its quota of judges, all appointed by the crown on the advice of the lord chancellor, all knighted on appointment, and entitled to a salary (raised in 1954 to £8,000 a year after having stood at £5,000 a year for more than a hundred years) and a pension on retirement.

The lord chancellor is the president of the chancery division; the lord chief justice of the queen's bench division; while the probate, divorce, and admiralty division has a president. Sittings of the high court, except those of the judges of the queen's bench division when on circuit, are held at the royal courts of justice, Strand, London, W.C.2. See also Chancery; Judge, etc.

High Force. A waterfall in Teesdale in the N. Riding of Yorkshire, England, 5 m. N.W. of Middleton. The bed of the



High Force. Magnificent waterfall in Teesdale, 5 m. from Middleton, Yorks

Tees here falls 72 ft. in three steep steps, and the river, forced suddenly into a channel 10 ft. wide, leaps in a single fall into the ravine below. The surrounding country is of great beauty.

Highgate. Residential suburb of N. London. The S. part of the district is partly in the met. bor. of St. Pancras, and partly in that of Islington; the N. part (Highgate Village), situated on a summit, 426 ft., is just outside the London co. boundary and in the Middlesex bor. of Hornsey. There are stations on the Northern Line, and bus and trolley bus services.

At the foot of Highgate Hill is Whittington's Stone, on the spot where Dick Whittington is said to have sat as he heard Bow Bells chiming the refrain. Turn again, Whittington, thrice lord mayor of London. At the foot of Archway Road are the almshouses, known as Whittington College, removed from the city in 1822. Between the two thoroughfares named is Archway branch of Whittington hospital. On the W. side of Highgate Hill are the S. Mary branch of Whittington hospital (formerly the infirmary); S. Joseph's Retreat, 1858-59, enlarged 1862 and 1889, mother house of the Passionist Fathers in England (its dome is a landmark); and Waterlow Park, 29 acres containing Lauderdale House, once the home of Nell Gwynn, presented to the public by Sir Sydney Waterlow in 1889, with Highgate cemetery to the W.

Open spaces, to the N., are Highgate Wood and Queen's Wood, 70 acres, public since 1886. The Village and its High Street retain something of their rural charm. Here are the Gothic parish church of S. Michael, 1832, the spire of which is a conspicuous landmark; Cromwell House, wrongly said to have been built

by the Protector for General Ireton and now headquarters of the mothercraft training centre; and Highgate School, founded in 1565 by Sir Roger Cholmeley and enlarged in 1899, the chapel of which, covering the old burial ground of Highgate Chapel, has a crypt containing the grave of Coleridge.

On West Hill is Holly Lodge, once a residence of the duchess of St. Albans and later the home of Baroness Burdett-Coutts. Coleridge lived in The Grove. Other notable residents include Francis Bacon, who died in the now-demolished Arundel House; several earls of Arundel, Lauderdale, Nell Gwynn, Marvell, Leigh Hunt, Arabella Stuart, Henry Sacheverell, Selina, countess of Huntingdon, Bishop Atterbury, Lord Southwood, W. Heath Robinson.



In Highgate cemetery are buried Faraday, Lord Lyndhurst, the parents of Charles Dickens, George Eliot, Karl Marx, F. D. Maurice, Christina Rossetti, and Tom Sayers.

Highgate's history goes back to the 14th century. It was once in the old forest of Middlesex, a hunting ground of Henry VIII. The bishops of London had a hunting park here, and the name is usually derived from a toll-gate erected at the top of the hill when the bishop in the 14th century allowed a road to be made through his park. Another and voluntary toll used to be levied on passing travellers, who were invited at the Toll Gate Inn and other hostleries to take the Highgate Oath, in

return for which, and expenditure on drink, they were declared free of the local liberties. Above Archway Road, opened 1813, is Highgate Archway; built to carry the road connecting Highgate with Crouch End, it was originally of stone, replaced in 1900 by the existing steel structure.

Highland. Term used for a tract of country standing at a considerable height above sea level. It has no reference to the structural character of the land, whether produced by folding or erosion, whether mountain chains or plateaux. In N. and S. America there are great highland systems to the W. and lower highlands to the E. Almost the whole of Africa is highland. In Europe the highlands are found in the N.W., the centre, and the S., while in Asia they cover the greater part of the S. and S.E.

In general, highland areas support fewer people than lowlands, but there are important exceptions, e.g. the open, grassy plateaux of S. Africa and of the Anglo-Egyptian Sudan, which are located in low latitudes, so that elevation there, by reducing the temperature, actually promotes settlement. Highlands frequently act as barriers to communication and



Highgate. The Archway, Gate, and Tavern as they were in 1826. Upper picture, the viaduct which replaced the old structure in 1900

thus hinder intercourse between peoples living on different sides of the barrier; examples of this are the Pyrenees, Caucasus, Alps, and Himalayas.

Highland areas are frequently inhabited by races driven there by stronger invaders who have taken possession of adjacent plains. In their highland homes they preserve their own language, manners, etc.



Highland Cattle. A group of this hardy breed raised chiefly in Argyllshire and the Western islands of Scotland

Highland Cattle. A breed of cattle found mainly in Argyllshire and the Western islands of Scotland. Whether it be the indigenous wild breed of the district or not, it is undoubtedly of great antiquity, and not greatly altered from the old Celtic shorthorn. It is the hardiest of all British breeds, and is left largely to roam the mountains in a half-wild state and to pick up its own living. It is practically free from disease, and its beef is of high value. Its long, shaggy coat varies in colour from a creamy yellow to reddish brown and black, and it is often kept in parks for ornamental purposes. See Cattle colour plate.

Highland Development Scheme. General term applied to a series of undertakings carried out in the Highlands of Scotland with a view to increasing the country's industrial potential, particularly in the damming of rivers and lochs to provide hydro-electric power. From 1930 private enterprise was building power stations in the Highlands, notably at Loch Ericht, at Lochaber, and at Loch Quoich. Construction met with strong opposition on the grounds that it destroyed natural amenities, while virtually all the current generated was transmitted to industrial centres, leaving only a small percentage for local farms and villages.

In 1941 all development of Highland water power became the responsibility of the North of Scotland hydro-electric board, a non-profit-earning public service corporation under the secretary for Scotland. Control of this body was incorporated in the Town and Country Planning (Interim Development) (Scotland) Act of 1944, by which land may not be developed without consent of a local planning authority. Up to 1953 the board had built or projected schemes to the value of £100,000,000 covering more than 100 power schemes.

Always it was laid down that local needs from any station would be met before power was supplied to other parts of Scotland. Plants in operation in 1953 included those at Glen Affric, Clunie, Fasnakyle, Pitlochry, Rannoch, Loch Sloy, and Tummel Bridge.

Highland Division. Infantry formation of the British Army. Constituted in the First Great War to include all battalions of the Highland regiments, it was reformed in 1921 as the 51st Division and composed of all the Territorial battalions of Highland regiments. It joined the B.E.F. in France in Jan., 1940, as part of 3rd corps and suffered heavy casualties in the defence of Le Havre and the retreat on Dunkirk. Trapped at St. Valery, the remnants were forced to surrender. Reformed in Britain, the div. fought throughout the N. Africa campaigns, and after service in Sicily and Italy joined 21st army group for the invasion of Europe, fighting from Falaise to the final advance on the Elbe. When the Territorial army was reorganised in April, 1947, the 51st Highland Division was amalgamated with the 52nd Lowland Division as the 51st Scottish Division (T.A.).

Highland Light Infantry. Former regiment of the British army. Raised as the 71st Foot by Lord Macleod in 1777, it first saw active service at Gibraltar, where it gained the castle and key on its badge. It went to India and fought in the Carnatic and Mysore and at Assaye. Having been at the capture of the Cape of Good Hope in 1806, it served under Wellington in the Peninsula. At Waterloo it charged the Imperial Guard. Later campaigns



Highland Light Infantry badge

were in South Africa (1851-53), the Crimea, the Indian Mutiny, Egypt, 1882, and the South African War of 1899-1902.

In 1881 the 71st Foot became the 1st, and the 74th Foot became the 2nd battalion of the Highland Light Infantry, and the regiment's kilts were replaced by tartan trews. It was then the only Highland regiment which did not wear the kilt. The kilt was restored in 1948. In the First Great War the Highland Light Infantry earned the honours: Mons; Ypres, 1914, '15, '17, '18; Loos; Somme, 1916, '18; Arras, 1917, '18; Hindenburg Line; Gallipoli, 1915-16; Palestine, 1917, '18; Mesopotamia, 1916-18; Archangel, 1919. In the Second Great War the regiment was in action in France, E. and N. Africa, Greece, Italy, and Europe 1944. When the Lowland Brigade was formed in 1957, the Highland Light Infantry was scheduled to amalgamate with the Royal Scots Fusiliers.

Highland Mary. Heroine of some of the noblest of the songs of Robert Burns (*q.v.*). According to the generally accepted theory her name was Mary Campbell, and she and the poet plighted troth and exchanged bibles, but marriage was prevented by her sudden death at Greenock in 1786. She was buried in the graveyard of Old West Kirk, Greenock. In 1920 her remains were reinterred in Greenock cemetery, the old graveyard having been absorbed by the extension of a shipbuilding yard.

Highland Regiments. General name for six units of the British army which were normally recruited in the Highlands of Scotland and all of which originally wore the kilt. They were the Black Watch, or Royal Highlanders, 42nd and 73rd; Seaforth Highlanders, 72nd and 78th; Gordon Highlanders, 75th and 92nd; Cameron Highlanders, 79th; Argyll and Sutherland Highlanders, 91st and 93rd, and the Highland Light Infantry. In 1957 the Seaforth Highlanders was amalgamated with the Cameron Highlanders and the four regiments were formed into the Highland Brigade.

Highlands, THE. Name given to that part of Scotland lying N. and W. of a line drawn from Dumbarton on the W. to Stonehaven on the E. The limitations are vague, but it is customary to exclude the coastal parts of Aberdeenshire, Nairn, Moray, and Banff, and the Orkneys and Shetlands. It thus

denotes generally the mountainous parts of the country and those, apart from Caithness and the Orkneys and Shetlands, where the Celtic race and the Gaelic speech predominate. The physical configuration of these parts, their relative inaccessibility and barrenness, and the racial characteristics of the inhabitants have combined to give the Highlands a distinctive place throughout Scottish history, and the "Highland line" still marks real differences in the life and manners of the two portions of Scotland.

Inverness is usually counted the capital of the Highlands. In the glens and other fertile tracts agri-

now with Lowlanders, now among the rival clans.

The first great step towards settling the Highlands was the Statutes of Iona, 1609, when Bishop Knox of the Isles arranged a compact with the great chiefs to regulate such matters as the maintenance of churches and clergy, the reduction of the chiefs' retinues, education, carrying of firearms, maintenance of inns, etc. Later came the road-building of General Wade, 1725, and the wholesale abolition of hereditary jurisdictions of the great chiefs, 1748. But conditions remained primitive until well on in the 19th century. Agriculture was improved by the

danger of obliteration. See Celt; Clan; Gaelic; Scotland.

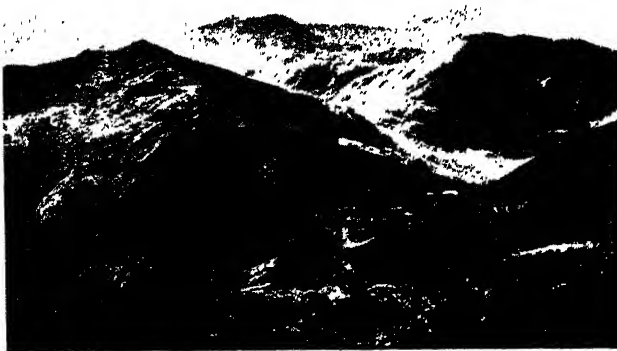
HIGHLAND DRESS. A form of kilt, common in Europe in early times. It was used notably by the Romans, was common to the Irish, the Manx, the Welsh, and ancient Britons, and is still the national garb of the Albanians. In Scotland it appears on the earliest known records of that land, the sculptured stones. Among these the Dupplin Cross is cited by Skene; the St. Andrews altar slab, found 6 ft. below the ground, is referred to by Romilly Allen as bearing a figure who wears a plaid and kilt. These monuments prove that the ancient Scots, when hunting or on horse-back, wore a kilt-like dress, falling below mid-thighs, and a plaid across the shoulders. Beneath the dress the Highlanders wore what was called the *leni croich* or Highland shirt, in Ireland called the *lenn*, which it was the custom to dye with saffron.

Early Form of Dress

The Scottish dress differed from the Roman, Welsh, and, at any rate from the later forms of, the Irish and Manx kilts, in the important fact that it—an *breacan feilidh*—formed a covering for the whole upper part of the body. It consisted of a great piece of tartan cloth. This was spread out upon the floor while the owner carefully kilted, that is pleated, one end of it. He then lay down and fastened the kilted portion round his waist with a belt. The unkilted part lent itself to great diversity of arrangement; one of the commonest methods was to draw it up the back and on to the front of the shoulder, where it was fastened by a brooch of large size, ornamented generally with interlaced patterns and cairngorm stones. This arrangement left a picturesque loop at each hip. The back portion could also be formed into a cloak which covered the head. The kilted portion was shorter than is now customary in the stitched, detached kilt or *feilidh beag*.

The length of the *breacan feilidh* was probably 12 yards. The short jacket opened down the front as in the time of the ancient Britons; the hose and the broad bonnet came later. The latter, with its red tauric, looks as though it had been evolved from the round, oval-topped morion which is shown on the sculptured stones, notably on the Aberlemno stone.

Examination of the drawings of the Forteviot stone, which is probably as ancient as its model-



Highlands. Panorama of the Breadalbane Range, Perthshire, from the summit of Ben Lawers: a typical Scottish hill scene

Robert M. Adam

culture is carried on, mostly in small-scale farming; the croft system prevails in many of the remoter districts. Sheep rearing is of great importance, sturdy hill sheep, especially of the black-faced varieties, being bred in large numbers. The grouse moors, deer forests, and salmon fisheries are of economic importance, and, apart from the wealthy classes who enjoy these sports, the summer months bring tourists to Oban, Pitlochry, Kingussie, and Strathpeffer.

The earliest history of the Highlands is obscure; neither ethnologists nor antiquarians have determined the precise development of the possibly Iberian dwellers of prehistoric times, of the Goidels, Caledonians, and Picts or Cruithnigh. The coming of S. Columba to Iona, A.D. 563, marks the beginnings of Christianity in the Highlands, but their history throughout the Middle Ages and the following centuries is a long record of confused wars, now with Norsemen,

Highland and Agricultural Society, founded 1784; but prolonged emigration, and the great "clearances" of crofting areas to make room for sheep-runs in the early 19th century, left results which are still felt in some districts. Thus it is not uncommon to find glens which now hold a mere handful of inhabitants, where formerly, as the remains of cottages and sheilings attest, scores of families were able to subsist.

The spread of education and improved transport facilities have greatly modified the distinctive life of the old Highlanders, but the Gaelic tongue survives in many parts, particularly in the W., either alone or side by side with English. The Celtic customs and folklore are not forgotten, and the Highland gatherings, e.g. of Braemar or Blair Atholl, foster the old pipe-music, dances, and sports. Indeed, recent years have seen a marked revival of the old language, music, and traditions which were in



Highland Dress, as worn by: 1. The Campbells of Breadalbane; tartan, green with double stripes of yellow. 2. The MacDonalds of Clan Ranald; tartan, dark and light green with red stripes; the figure is armed with sword and leather target. 3. The Camerons in the 18th century; tartan, red with green and white stripes

ling is primitive and crude, brought the writer to the conclusion that the figure portrayed is wearing a "Glengarry" with a decoration along the front, where we now place the *dam brod* or chequers. At the back a tuft of hair is showing, and round this flow what look like the tails of a bonnet. The Glengarry shape may have descended from the cap of maintenance. The truis or trows (skin-tight breeches) are as ancient as the plaid. Similar truis were worn by the most servile class in ancient Ireland, and amongst the Britons. They were probably inherited from the slaves who, amongst the Gaels, were either of the conquered earlier race, or Gaels who had lost their rank as freemen.

The modern form of kilt, or *feilidh beag* (i.e. little covering), can be traced to 1626, when it appears on the arms of the Burnets of Leys. The feathers worn in the Highland bonnet were, says General Stewart (1822), a privilege accorded as a token of gentility. The jacket and the hose were also of tartan, as were the trows. The hose were often made without feet, and were in that case known as *mogans*. The *bhrogan* (vrogan), i.e. shoes, were cut to the actual shape of the foot, and had holes in them for the escape of water. The *breacan feilidh* was common to the greater part of Scotland, and after the conquest of the Lothians, if it had ever died out there, which is doubtful, became common to all Lowland Scotland. Part of

it, the plaid and braid, or Kilmarnock Tam o' Shanter, actually lingered there till the 20th century, though now seldom seen. The Highland dress was proscribed by Act of Parliament in 1747, but the Act was repealed amid great rejoicing in 1786. See Bagpipes; Celt; consult Highland Dress, Arms and Ornament, Lord Archibald Campbell, 1899. McKenzie McBride

Highness. Title of honour applied to English sovereigns until the reign of James I, when Majesty became the official style. In the British royal family, Royal Highness is used for children of the sovereign, and for his or her brothers, sisters, uncles, aunts, grandchildren, if children of sons, and great-grandchildren, if children of the eldest son of a prince of Wales; nephews, nieces, cousins, and children of daughters are called Highness. Children of Elizabeth II, when she was heiress presumptive, were made R. H. by letters patent.

High Priest. Head or chief priest of the Jewish Church. From Aaron, to whom priestly authority was delegated by Moses, the office descended by primogeniture. There appear to have been about 80 high priests beginning with Aaron and ending with Phannius, but the direct Aaronic line ended with Eleazar. Their history covers a period of about 1,370 years. Their consecration was attended by elaborate ritual, their dress was distinctive, and their duties included the privilege of entering the

Sanctuary on the Great Day of Atonement to make propitiation. Details of their consecration, etc., are given in Exodus, Leviticus, and Numbers. See Aaron; Breastplate; Ephod; Priest; consult also Josephus's Antiquities of the Jews.

High Seas. Those parts of the ocean not under any territorial sovereignty, being more than 3 m. from shore. Germany called her fleet of the First Great War the high seas fleet. See Freedom of the Seas.

High Sheriff (A.S. *scire gerefa*, reeve, or officer of the shire). One of the principal subordinate magistrates in England to whom the custody of the county is committed by the crown by warrant under the hand of the clerk of the privy council. In some counties the office was anciently hereditary, in others elective, subject to the royal approval. To obviate the inconveniences of popular election, a statute of Edward II enacted that the sheriffs should be assigned by the chancellor, treasurer, and judges; and since the reign of Henry VI the custom has been for all the judges, with the other great officers and privy councillors, to meet in the exchequer on the morrow of S. Martin, and to propose three persons to be reported, if approved, to the sovereign, who afterwards pricks one of them, i.e. appoints him sheriff.

Formerly the powers and duties of the high sheriff were very great in his fourfold capacity of judge,

keeper of the peace, ministerial officer of the superior courts of justice, and bailiff of the sovereign. In modern times his duties are mainly performed by an under-sheriff, who is usually a solicitor, and the high sheriff is the chief personage of the county who receives the judges on circuit, acts as returning officer at elections, executes civil judgements, and sees to the due carrying out of the death sentence. Sheriffs hold office for a year, and no man who has served can be compelled to serve again within three years. *See* County; Sheriff.

High Tor. Hill in Derbyshire, England. It is on the left bank of the Derwent, between Matlock and

for each parish but added a district surveyor for a group of parishes and a highway board for densely populated parishes. Since that time the responsibility for repair has been increasingly centralised. Highways are now classed as trunk roads, county roads, or ordinary highways.

Trunk roads, the principal national thoroughfares, are repaired by the ministry of Transport. County roads—i.e. other main roads—in a borough are repaired by the borough council, and elsewhere by the county council. Ordinary highways in a borough are likewise repaired by its council; within an urban district, by that council; elsewhere by the county council.

No one may be under any liability to repair highways dedicated to the public since 1835. *See* Road.

Highway Code. THE. Official code of conduct for road users in Great Britain, pedestrians as well as motorists and cyclists. The first Highway Code was issued

by the ministry of Transport in 1931, over 5,000,000 copies being distributed; later editions, intended to help lower the toll of road accidents, had an even wider distribution, and in 1946 and 1956 completely rewritten versions were issued. Although the code has no legal status, it includes a summary of the principal clauses of the Road Traffic Acts.

Highwayman. Name given to the mounted robbers who infested the public roads in England from the first half of the 17th century

until the early 19th. In literature the highwayman was a familiar figure, for which Falstaff suggested such poetical designations as "Diana's foresters, gentlemen of the shade, minions of the moon."

Among well-known highwaymen is Claude Duval (1643-70), who is remembered by the episode depicted in W. F. Frith's painting, where he is dancing a coranto with a lady, whose husband, after paying £100 for the entertainment, has been allowed by the gallant highwayman to keep the remaining £300 in his bag; another is Dick Turpin (1706-39).

To these may be added John or William Nevison (1639-1684), nicknamed "Swift Nicks" by Charles II; John Cottington (1611-1656), called "Mulled Sack" from his favourite beverage, who held up the army pay wagon on Shotover Hill and decamped with £4,000; Jack Rann (d. 1774), the dandy highwayman, nicknamed "Sixteen-String Jack" from the bunches of ribbons at his knees; and Louis Jeremiah Abershaw or Avershawe (c. 1773-1795), commonly known as Jerry Abershaw.

High Willhays. Mt. of Devon, England. It is 4 m. S. of Okehampton, and is the highest point on Dartmoor, 2,030 ft.

High Wycombe (formerly Chipping Wycombe). Bor. and market town of Bucks, England. It lies

27 m. W.N.W. of London, at the foot of the Chiltern Hills, in a valley through which pass mainly lines from Paddington and Marylebone. The earliest charter was granted in 1237.

The parish church, the largest in the co., was founded in the 11th century, has 13th-16th century remains, and was restored in 1893.



High Wycombe arms



High Tor, Derbyshire, seen from the banks of the river Derwent

Matlock Bath, and is a sheer mass 380 ft. high. On the other side of the pass, which it helps to form, are the Heights of Abraham. Beneath the hill is High Tor grotto, famous for its crystallisations.

High Water. Term used for the normally highest limit of the rise of the tide in the sea or river, and for the time of such rise. High water at any particular place by the sea happens on the average every 12 hrs. 25 mins., so that it becomes 50 mins. later each day. Successive high waters are often not of the same height, and vary considerably according to the phases of the moon and the lie of the land. High water level in rivers is usually the highest flood level.

Highway. In English law, any way along which the public are entitled to pass. A public footpath is thus a highway. Formerly the inhabitants of each parish were required to keep in repair their own highways, each parish having to appoint surveyors of highways. Such a system may have been satisfactory when road traffic was small and local.

The Highway Act, 1835, retained the surveyor of highways



High Wycombe, Bucks. The market place, showing, left, the Guildhall, designed by the Adam brothers in 1767; right, the octagonal Little Market House, which dates from 1804, and the parish church of All Saints

Wycombe Abbey school is a famous public school for girls.

The Little Market House dates from 1604, and the guildhall from 1757. A civic centre comprises town hall, municipal offices, and police station. Near by are Hughenden, in 1839-81 the home of the earl of Beaconsfield, and Penn, the supposed birthplace of William Penn. High Wycombe makes furniture and paper, and engages in light engineering. It is included in the county constituency of Wycombe. Pop. (1951) 40,692.

Hiiu OR **HIUMAA** (Estonian *maa*, island). The Estonian name for the Baltic island described in this work as Dagö (*q.v.*).

Hiking. Tramping about the countryside for pleasure or exercise. The etymology of the word is doubtful, but it appears to be derived from an old English dialect term with several local meanings; in Northants it describes a swinging gait. Early in the 20th century it was adopted by boy scouts in the New England states of the U.S.A. to describe their cross-country journeys on foot, carrying their own baggage. British boy scouts were the first to bring the word back to its country of origin. After the First Great War country walking enjoyed a wide popularity in Great Britain as a means of spending a cheap holiday; and the term hiker came to be applied to those who toured from place to place on foot, carrying their personal luggage on their backs. The hiker is distinct from the Rambler, who restricts his pedestrianism to short walks, usually combined with nature or historical study.

Hilary OR **HILARIUS** (c. 300-368). French bishop and saint. Born at Poitiers, France, the son of pagan parents of high social standing, he was converted to Christianity c. 350. Chosen bishop of his native city c. 353, probably from the rank of a laic, he became famous as an opponent of Arianism. He was banished to Phrygia by the Emperor Constantius, 356-360. He died at Poitiers, Jan. 13, 368, and was declared a doctor of the Church by Pius IX, 1851.

Hilary's writings included a History of Synods, a survey of the councils of the East on Arianism; a defence of the Nicene faith, addressed among others to the British bishops; a work of permanent value on the Trinity, defining the philosophic doctrine of the divinity of Christ, a smaller tractate against the Arians, and hymns, now lost. His festival is kept Jan. 14. The village and

church of S. Hilary, Cornwall, are named in his memory.

The name Hilary sittings, peculiar to the English law courts, is a survival of Hilary term (Jan. 11-Jan. 31), named after the festival of the saint, and one of the four terms of the legal year, for which Hilary sittings was substituted in 1873. These sittings begin on Jan. 11 and end on the Wednesday before Easter. In the Inns of Court (*q.v.*), Hilary is one of the four dining terms, Jan. 11-Feb. 1. Hilary term is the name given at Oxford university to the term which begins on Jan. 14 and lasts until the Saturday preceding Palm Sunday. See Term.

Hilda OR **HILD** (614-680). English abbess and saint. Daughter of Hereric, a nephew of King Edwin of Northumbria, and baptized by Paulinus in 627, she adopted the monastic habit when 33 and went to East Anglia with a view to emulating the example of her sister, Hereswid, a nun of Chelles, near Paris. She became abbess of Hartlepool, and in 657 founded the Benedictine abbey at Whitby where, as at Hartlepool, she presided over a community of men and women. Here she received the poet Caedmon (*q.v.*), who, under her advice, became a monk; her counsel was sought by some of the most influential people in the country. Shortly after founding a monastery at Hackness, she died at Whitby, Nov. 17, 680. Consult Vita Sanctae Hildae, A. D. H. Leadman, 1902; Dictionary of Saintly Women, A. B. C. Dunbar, 1904.

Hildebrand. Name of Gregory VII (*q.v.*) before he was chosen pope. Of Teutonic origin, it means battle-sword, and appears in the Nibelungen Lied. It is occasionally used as a Christian name today.

Hildesheim. City of Lower Saxony, West Germany. Once a perfect specimen of medieval architecture, it was a ruin when the U.S. 9th army reached it April 9, 1945, during the Second Great War. It is situated 18 m. S.S.E. of Hanover, on the small river Innerste, surrounded by low, wooded hills. It was a rly. junction and an inland port connected with Germany's main canal, also an airport. There were factories for heating, laundry, agricultural machinery, and rubber, and bell and iron foundries.

Its main interest, however, was the well-preserved inner town, with Romanesque, early Gothic, and timber-frame buildings, hundreds of which, with richly carved and



Hildesheim. The Roland Hospital, with carved beams and panels, built in 1611

often painted fronts, faithfully rendered the scene of a German town of from 4 to 6 centuries ago. Outstanding among those buildings were the three Romanesque basilicas, S. Michael's (1010-36), the Catholic cathedral (1050) with a bronze door, and valuable old sculptures, and S. Godehard's (1113-90); S. Magdalen's (13th century), S. Andrew's (1100, enlarged 1415), S. Cross (11th cent., Baroque reconstruction 18th cent.), S. James's (1504) with a famous organ, and S. Maurice's (11th cent.). The town hall, the Templar's, the Imperial, and the rich Knochenhauer-Amt houses, all 13th to 16th century, a Roland fountain, and scores of other famous buildings, the Roemer and other museums, schools, theatre, and learned societies contributed to Hildesheim's unique atmosphere. Only S. Maurice's church remained intact after the Second Great War. S. Godehard's was repaired. Most of the city's movable treasures had been evacuated and were saved.

The town was founded as a bishopric in 815 A.D., prospered between 1000 and 1500, was recognized as a sovereign chapter in 1235, and became a Hanseatic town: it suffered from dynastic, and, after the Reformation, from religious wars, fell in 1802 to Prussia, in 1807 to the short-lived kingdom of Westphalia, in 1813 to Hanover with which it remained, being during 1866-1945 under Prussia. It was in the British zone of occupation after the Second Great War. Pop. 62,519.

Hill, ROWLAND HILL, 1st Viscount (1772-1842). British soldier. Born at Prees Hall, near



1st Viscount Hill,
British soldier
After W. Haines

being in command of the 90th regiment. During the Peninsular War he was present at most of the chief battles, and at the end of the war was one of the five of Wellington's chief officers honoured with a peerage in 1814. He also did notable service at Waterloo. He was commander-in-chief from 1828 to 1842; in the latter year he was created Viscount Hill. He died Dec. 10, 1842.

HILL, ARCHIBALD VIVIAN (b. 1886). British physiologist. Born Sept. 26, 1886, he was educated at Blundell's and Trinity College, Cambridge. A fellow of Trinity College, 1910-16, Brackenbury prof. of physiology in Manchester university, and Foulerton research prof. from 1926, he was elected F.R.S. 1918 and was secretary of the Royal Society, 1935-45. He gained the Nobel prize for physiology and medicine, 1922. During the Second Great War he was chairman of the executive committee of the national research laboratory, and a member of the war cabinet scientific advisory committee and other scientific committees, his particular concern being air defence. Hill was Independent Conservative M.P. for Cambridge university, 1940-45; he was made C.H. 1946. He published *Living Machinery*, 1927, and monographs and papers in scientific journals.

HILL, SIR ARTHUR WILLIAM (1875-1941). A British botanist. Born Oct. 11, 1875, he was educated at Marlborough and King's College, Cambridge, where he proved a brilliant student in the natural sciences. Senior demonstrator, 1899, and university lecturer in botany, 1905-07, he was assistant director of the royal botanic gardens, Kew, 1907-22, director, 1922, until his death in a riding accident Nov. 3, 1941. His special interest was plant morphology; he published many papers on this and other aspects of botany. He also encouraged interchange of knowledge with other botanical stations of the British Commonwealth. Hill, who was an F.R.S., was knighted in 1931.

HILL, DAVID JAYNE (1850-1932). American historian. Born in New Jersey, June 10, 1850, he was educated at Bucknell university and in Paris and Berlin. He became an authority on diplomacy and international law, and in 1899 was appointed prof. of European diplomacy in the school of comparative jurisprudence at Washington, and also an assistant secretary of state. From 1903 to 1911 he was successively U.S. ambassador in Switzerland, the Netherlands, and Germany. He was a member of the Hague tribunal and a delegate to the second peace conference at The Hague in 1907. He wrote a number of books on diplomacy, among them *A History of Diplomacy in the International Development of Europe*, 6 vols., 1905; *The Establishment of Territorial Sovereignty*, 1906; *The Problem of a World Court*, 1927. Died March 2, 1932.

HILL, DAVID OCTAVIUS (1802-1870). Scottish artist and pioneer of photography. Born at Perth in 1802, he received his early artistic training under Andrew Wilson, superintendent of the school of art at Edinburgh, and exhibited his first picture 1823. In 1830 he became secretary to the Edinburgh society of artists, later the Royal Scottish Academy, a post he held until a few months before his death. In 1841 he published a series of sixty pictures engraved from oils illustrating the Burns country, and in 1843 began his great historical picture, *Signing the Deed of Demission*, which contained 500 portraits of the leading lay and clerical members who took part in the ceremony; it was completed in 1865, and is now in the free church assembly hall, Edinburgh. His works were all admirably suited for engraving, and he is better known by reproductions through this medium than by his original paintings.

On the advice of Sir David Brewster (*q.v.*) Hill interested himself in the photographic experiments then being made by Robert Adamson. Hill was the first to apply the new art to portraiture, and, despite the crude quality of the material then available, turned out portraits that have seldom been surpassed. Many of the calotypes of eminent men which he took are still in existence, one of his most notable studies being that of R. S. Rintoul, taken in 1845. He was also the first artist to use photography as an aid (for *Signing the Deed of Demission*) in portraiture. Hill

founded the art union of Edinburgh, the first of its kind in Britain, and was a commissioner of the National Gallery of Scotland.

HILL, FLORENCE DAVENPORT (1829-1910). A British reformer. As a girl she assisted her father,



Florence D. Hill,
British Reformer
Elliot & Fry

Matthew D. Hill, recorder of Birmingham, in his campaign and writings to promote the establishment of reformatories for juvenile offenders. In her book *Children of the State*, 1868, she urged the abolition of the old system of herding destitute children in work-houses. In the early seventies she became one of the first women poor law guardians, and in 1868 drafted the bill, passed into law, setting up children's courts. She also took a great interest in the movement for women's suffrage. She died Nov. 2, 1919.

HILL, JAMES JEROME (1838-1916). American rly. magnate. Born in Ontario, Sept. 16, 1838, he graduated at Yale and in 1856-65 was employed in clerical work in St. Paul, Minnesota. In the latter year he became agent of the N.W. Packet co. and in 1870 organized the Red River Transport co., by which communication was established between St. Paul and Winnipeg. During 1879-90 he controlled the St. Paul, Minneapolis, and Manitoba railroad, which he had founded, and on its incorporation with the Great Northern became president of the latter, which, with its transcontinental line to Puget Sound, ran a steamship line to China and Japan. Hill controlled many large railway and banking enterprises. He died May 29, 1916.

HILL, JOHN (c. 1716-75). British quack doctor. An unsuccessful apothecary with a leaning towards literature, in 1746 he produced *The British Magazine*, and on the death of this journal contributed a series of gossiping letters signed *The Inspector to The London Advertiser*, which gained him a certain reputation. Running foul of Fielding, he drew on himself a severe castigation in the latter's *Covent Garden Journal*, 1752; he also abused Garrick, Woodward the actor, and Christopher Smart. In 1759 he returned to his herbal studies and began *The Vegetable System*, an undertaking which reduced him to poverty, and he

turned to quack doctoring for a livelihood. He died Nov. 21, 1775. His life's work may be summed up in Garrick's epigram:

For physic and farces his equal there scarce is,
His farces are physic, his physic a farce is.

Hill, Sir Leonard Erskine (1866-1952). A British physiologist. The son of G. Birkbeck Hill, he was born June 2, 1866. Educated at Haileybury and University College, London, he became professor of physiology in the London Hospital. He was a member of the navy and army medical advisory boards. Among other works he wrote *Physiology and Pathology of the Cerebral Circulation*, 1896; *Manual of Physiology*, 1899; *Physiology for Beginners* 1902; *Textbook of Physiology*, 1919. F.R.S. from 1900, he was knighted 1930. He died March 30, 1952.

Hill, Octavia (1838-1912). British philanthropist. She received her education at home, and early



Octavia Hill,
British philanthropist
After a portrait by
J. S. Sargent

undertook the management of homes for the poor people in London. Among her numerous charitable and social activities were efforts on behalf of women's university settlements, and the

preservation of the public commons and of places of historic interest. She was connected almost from the first with the Charity Organisation and Kyrle societies. She was a member of the royal commission on the poor law, 1905. Among her published works were *Homes of the London Poor*, and *Our Common Land*. She died Aug. 13, 1912. *Consult* Letters ed. by E. S. Maurice, 1928; *Lives*, E. Moberly Bell, 1942; W. T. Hill, 1956.

Hill, Sir Rowland (1795-1879). British reformer. Born at Kidderminster, Dec. 3, 1795, he was for some time engaged in teaching, after which he devoted his attention to matters of social and public interest. In 1837 he published a pamphlet entitled *Post Office Re-*



Rowland Hill
After Winter

form, in which he advocated a uniform rate of postage at a penny a half ounce prepaid by an adhesive stamp. Despite opposition, an act carried through parliament in 1839 brought the introduction of penny postage on Jan. 10, 1840. A change of government next year led to Hill's dismissal in 1842. Public appreciation, however, was expressed in the subscription of £13,000 presented to him, 1846. He was appointed secretary to the postmaster-general 1847-54, secretary to the post office 1854-64. He was made K.C.B. in 1860. He died at Hampstead, Aug. 27, 1879.

Hill, Rowland (1744-1833). English preacher. Born at Hawkstone Park, Aug. 12, 1744, the son of Sir Rowland Hill, Bart. (d. 1783), he was educated at Eton and St. John's College, Cambridge. In 1773 he became curate at Kingston, Somerset, being then in deacon's orders. Rejected for the priesthood owing to his eccentricity, he continued to preach about the country as one of the numerous and nominal chaplains to Selina, Lady Huntingdon (q.v.). In 1783 he began a ministry at Surrey chapel, Blackfriars Road, London, built by himself, where he attracted large congregations. He died April 11, 1833. His book, *Village Dialogues*, went through numerous editions.

Hill 60. Name, derived from a military map reference, which was given during the First Great War to a low, almost invisible eminence, 2½ m. S.E. of Ypres, Belgium. Hill 60 was of tactical importance, as fire from it enflamed the British position in the Ypres salient, and the summit gave the Germans good observation of British movements and dispositions. On April 17, 1915, the Royal Engineers exploded six mines under the hill, and the crest was captured by the infantry. It was held at heavy cost until May 5, when the Germans by gas attack retook all but the W. slope. It was recovered by the British in the operations for the Messines Ridge, but again fell after the German offensive on the Lys, remaining in enemy hands until the Allied advance of Sept., 1918. In 1920 the site of Hill 60 was purchased as a war memorial.

The term was also applied to a hill in the N. part of the Sari

Bair range on the Gallipoli peninsula. On Aug. 21, 1915, Australian infantry captured the hill, enabling the British to form a continuous trench line.

Hill 70. Name, derived from a military map reference, which was given during the First Great War to a hill 230 ft. high in the dept. of Pas-de-Calais, France, giving artillery domination over Lens. A main objective in the battle of Loos (q.v.), 1915, it was captured on Sept. 25 by the 15th Scottish div.

Hilla or Hiller. Town and liwa (dist.) of Iraq. The town, on the Lower Euphrates amid the ruins of Babylon, is about 60 m. S. of Bagdad; it is much frequented by Shiah pilgrims on their way to the Holy Cities of Kerbela and Nejef. Pop. (est.) town, 30,000; liwa, 260,000.

Hillary, Sir Edmund (b. 1919). New Zealand mountaineer. Born July 20, 1919, and educated at Auckland grammar school, he became an apiarist in 1936, leaving this work during 1944-45 to fly with the R.N.Z.A.F. in the Pacific. He climbed in the Himalayas with the N.Z. Gawhal expedition 1951 and the British Cho Oyn expedition 1952; and on May 29, 1953, with Sherpa Tensing, reached the summit of Everest, the first time it had been scaled. For this he was made K.B.E., 1953. In 1955 he was appointed leader of the N.Z. transantarctic expedition.

Hiller, Wendy (b. 1912). British actress. Born at Bramhall, Cheshire, Aug. 15, 1912, she was educated at Bexhill. She joined the Manchester repertory theatre, making her début there in *The Ware Case*, 1930, and toured in Sir Barry Jackson's company. She first appeared on the London stage in *Love on the Dole*, 1935, repeating her performance in New York the following year. After playing in Shaw repertory at Malvern festival, 1936, she appeared in a revival of *The Cradle Song*, 1943, in *The First Gentleman*, 1945-46, in *The Heiress* (New York, 1949, London, 1950), and in *Waters of the Moon*, 1951. She achieved international fame as Eliza Doolittle in a film of Shaw's *Pygmalion*, 1939, and as his Major



Sir Edmund Hillary,
Conqueror of
Everest

Barbara (film), 1941. Her later films included *I Know Where I'm Going* and *Outcast of the Islands*.

Hill-fort. Stronghold built on the summit of a natural eminence. Many thousands have been found all over the world dating from Neolithic times onwards. A number of great cities, among them Jerusalem, Athens, Rome, Edinburgh, originated as hill-forts.

In Britain and western Europe the term is especially applied to the strongholds which first became common in the Early Iron Age when there was considerable tribal unrest. The typical hill-fort was a place of refuge for times of danger or invasion, not a permanent town. The defences usually follow the contours of the hill and consist of ditches and of ramparts formed of the soil taken from the ditches. In rocky country the ramparts are of stone (Worlebury, Somerset; Tre'r Ceiri, Carnarvonshire). The prominent fort, built on a spur usually has defences at the base of the spur only. Many Neolithic earthworks, e.g. those on Windmill Hill, Wilts, are not, strictly speaking, hill-forts, as the ditches do not form a continuous ring: such works were used by the inhabitants for living in rather than for defence. The earlier Iron Age hill-forts have a single rampart and ditch (St. Catherine's Hill, Winchester), but the later types sometimes have several ditches and ramparts and elaborate entrances (Maiden Castle, Dorset).

Hill-forts in what is now Wales and Scotland are generally some what later than those in England. In Ireland the primitive stronghold is called a rath, liss, or dun. Many of these are on low ground but there are a number of true hill-forts ascribed to the Neolithic and Iron Ages.

Hillhead. Parish and former burgh of Lanarkshire, Scotland. It was incorporated in the city of Glasgow, of which it formed a residential suburb, in 1891. Glasgow university is in Hillhead, which gives its name to a burgh constituency of Glasgow.

Hilliard, Nicholas (1537-1619). English artist. Born at Exeter, he was appointed goldsmith, carver, and limner to Queen Elizabeth, and became probably the first English miniaturist. He later worked for James I, who gave him a monopoly as royal portraitist in 1617. Hilliard's miniatures, much influenced by Holbein, are remarkable for precise detail and beauty

of colour and design, and he is important as being the founder of the English miniature school. He died Jan. 7, 1619, his patent passing to his son, Lawrence (d. 1640), who worked also for Charles I. Lawrence Hilliard's miniatures are highly prized. *Consult* Lecture on Nicholas Hilliard, J. Pope-Hennessy, 1949.

Hillman, Sidney (1887-1946). American labour leader. Born at Zagare, Russia, of Jewish parents, he took part in the abortive revolution of 1905, and spent several months in prison. Coming to England, he worked in a Manchester store. Moving to the U.S.A., 1907, he found work in Chicago, where he formed a group of fellow-artisans from Europe into a union, the amalgamated clothing workers, with himself as president. With John L. Lewis he founded the committee (later congress) of industrial organizations of which he was national chairman. He was an ardent supporter of the New Deal, and became F. D. Roosevelt's chief labour adviser in organizing the national defence programme during the Second Great War. In 1944, through his political action committee of the C.I.O., he contributed much to Roosevelt's re-election as president. He helped to draw up the constitution of the world federation of trade unions, formed 1945. He died at Point Lookout, Long Island, July 10, 1946.

Hillsborough. Market town of co. Down, N. Ireland. It is 12 m. from Belfast, and is served by rly. and the Lagan Canal. The chief industry is the linen manufacture. Here is Government House, residence of the governor of Northern Ireland. Formerly known as Hillsborough Castle, this house was once the seat of the marquess of Downshire. Pop. 580.

Hillsborough, a suburb of Sheffield, includes Sheffield Wednesday football club ground, and gives its name to a bor. constituency.

Hilo. Town of the territory of Hawaii (q.v.), on the island of Hawaii. Situated on the E. side of the island on Hilo Bay, it has the best harbour in the islands and is second only to the capital, Honolulu, in size. It is within 40 m. of the active volcano, Mauna Loa, 35 m. of the quiescent volcano, Mauna Kea, the loftiest peak in the Pacific, and 30 m. of another, Kilauea. Surrounded by lava fields and forests, it is a favourite tourist centre. It has a lighthouse. Pop. 23,353.

Hilton, James (1900-1954). British novelist. Born at Leigh, Lancs, Sept. 9, 1900, he was

educated at Leys School and Christ's College, Cambridge. His first novel, *Catherine Herself*, was published in 1920, and with the appearance of *Lost Horizon* (q.v.), which was awarded the Hawthornden prize, 1934, he achieved international fame as an imaginative writer. His other novels included *Knight Without Armour*, 1933; *Goodbye, Mr. Chips*, 1934 (dramatised 1938); *Random Harvest*, 1941; *So Well Remembered*, 1946 (all, like *Lost Horizon*, filmed). He died at Long Beach, Calif., Dec. 21, 1954.

Hilton, John (1880-1943). A British statistician and broadcaster. Son of a postman, he was

born at Bolton, Dec. 28, 1880, and was educated at the grammar school and at evening classes there. As a young man he became manager of a loom-fitting firm. In 1913 he was



John Hilton.
British statistician
and broadcaster

chosen by Norman Angell as lecturer under the Garton foundation. During the First Great War he examined the methods of German food control, and his researches were the basis of British rationing. He later became director of statistics at the ministry of Labour, and travelled all over the world, studying conditions. He began to broadcast in 1934, becoming increasingly well-known in this sphere as a friendly speaker on all manner of human problems. He held the chair of industrial relations at Cambridge, 1931-43, and was director of home publicity, ministry of Information, 1939-40. Hilton died Aug. 28, 1943.

Hilversum. Town of the Netherlands, in the prov. of N. Holland. It lies 18 m. by rly. E.S.E. of Amsterdam, and is a favourite summer resort. It is the junction for Amersfoort, and is connected by steam tramway with Huizen and Laren. Here is the principal broadcasting station of



James Hilton.
British novelist

the Netherlands, and notable among the fine examples of modern architecture in the town are the broadcasting station and the town hall. Pop. 89,500.

Himachal Union OR HIMACHAL PRADESH. Centrally administered area (chief commissioner's state 1950-56), of India, an amalgamation, formed April 15, 1948, of the former Punjab hill states of Baghal, Baghat, Balsan, Bhajji, Bija, Bashahr, Darkoti, Dhami, Jubbal, Keonthal, Kumarhsain, Kunihar, Kuthar, Mahlog, Sangri, Mangal, Sirumur, Tharoch, Chamba, Mandi, and Suket. Bilaspur was added in 1954. Simla is the capital. Total area 10,904 sq. m.: pop. (1951) 1,109,466.

Himalaya OR HIMMALEH MOUNTAINS (Sanskrit, abode of snow). Vast mountain system of Central Asia, containing the loftiest peaks in the world. From the Hindu Kush and the Pamirs, the mountains trend S.E. through Kashmir, and along the frontiers of the United Provinces, Nepal, Sikkim, and Bhutan, forming a stupendous barrier between N. India and the high plateau land of Tibet. Thus they may be said to stretch from the confines of Afghanistan to Upper Burma, as the Brahmaputra is regarded as the eastern limit. They occupy a vast area extending between lat. 27° and 35° N., and long. 72° and 96° E., and are the south-easternmost of the ranges radiating from the Pamir plateau.

The extreme length from W. to E. is about 1,550 m., and the breadth averages 200 m. They must be regarded not as a single range, but rather as a series of parallel chains running diagonally to the general trend of the system. There are also transverse sections form-



Himalaya Mountains. View from Mount Phalut, Darjeeling, of a portion of the range of everlastingly snow-clad peaks

ing knots or jumbles of snow-clad summits, separated by gorges, elevated plateaux, and valleys, the cradle of many streams and rivers, which are fed by the melting snows of the mountains and flow turbulently through deep chasms.

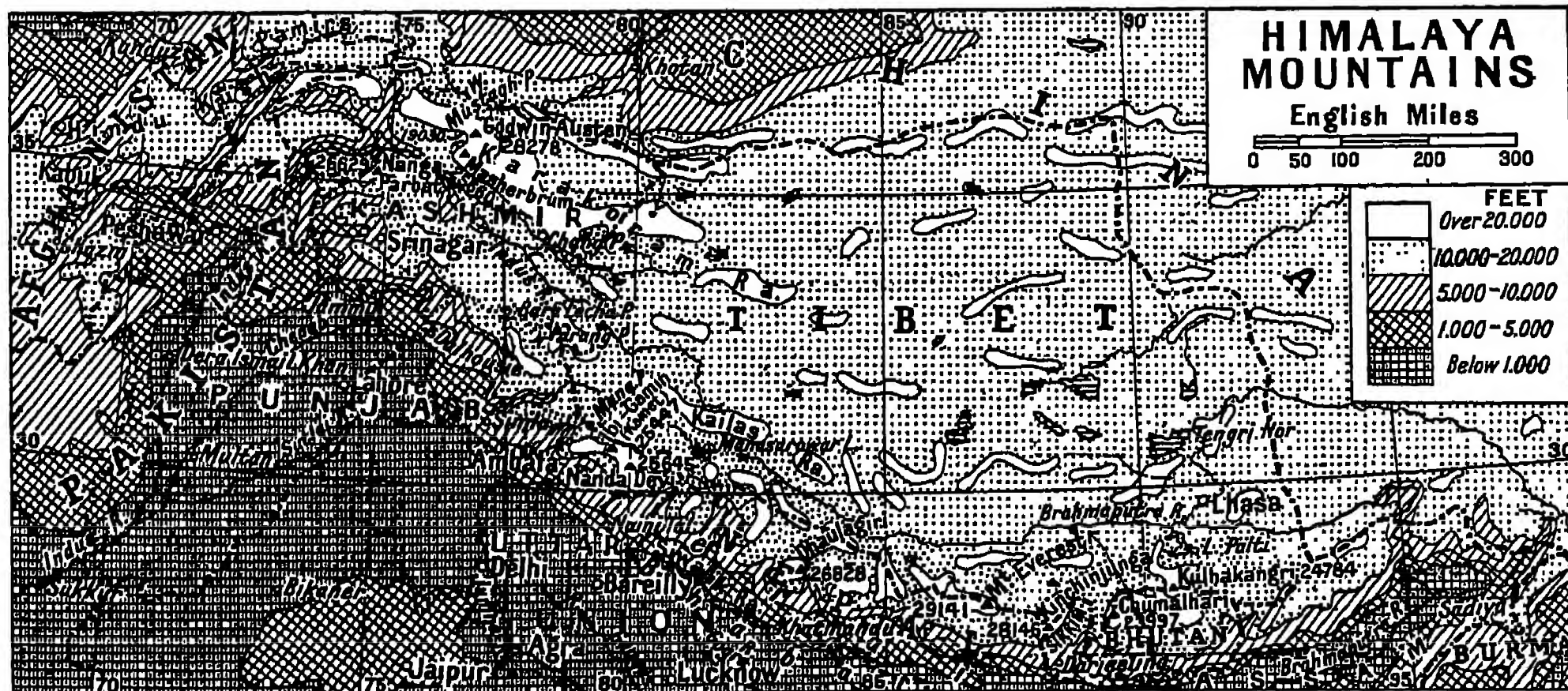
There are fertile and highly cultivated tracts at the base of the mountains on the Bhutan and Nepalese borders, and also a marshy and wooded region known as the Terai, which extends for about 500 m. along the N. frontier of India and Nepal, terminating to the E. of the spot whence the Ganges issues from the heights.

This swampy and unhealthy tract, the home of virulent fevers, is separated from the foothills by a boulder-strewn and scrubby belt, called the Bhabar. Much of it is wildly overgrown, and the streams emanating from the higher ground percolate through the sandy soil to feed the streams that wind about the swampy Terai. Above the Bhabar are the Siwalik Hills (*q.v.*), which reach an alt. of 4,000 ft., and beyond them again the giants of the system rear their summits.

The average alt. of the Himalayas has been estimated at between

16,500 ft. and 18,000 ft., but there are many summits rising to a height of over 24,000 ft. The highest point known on the globe, Mt. Everest, which lies on the borders of Tibet and Nepal, reaches the immense altitude of 5½ m. Much of the system is still unexplored, and it is conjectured that there may be other summits of even higher alt. A series of expeditions on foot between 1921 and 1938, and an air expedition in 1933, added considerably to knowledge of Everest (*q.v.*) and its environs. Other gigantic summits are Dhaulagiri, 26,828 ft., and Kinchinjunga, with an alt. of 28,146 ft., both in the central part of the system. Chumalhari, in the E., is 23,997 ft. high. If the Karakoram or Muztagh range be included, as it often is, in the Himalayan system, Mt. Godwin Austen, formerly known as Dapsang or Peak K2, may be mentioned, which has an alt. of 28,278 ft., and is second only to Mt. Everest itself.

Among the numerous passes, the loftiest is Ibi-Gamin, which reaches 20,460 ft., N.W. of the giant peak of Nanda-Devi; others are the



Himalaya Mountains. Map of the great mountain system which divides the sub-continent of India from the main part of Central Asia, and contains the world's highest points

Mustagh Pass, with an alt. of 19,030 ft., Mana Pass, Bara Lacha, the Parang Pass, and the Chang, all exceeding 16,000 ft. They are all difficult to cross, and the conditions prevailing are semi-arctic. They are mainly used by Indian and Tibetan traders, who load their goods on yaks and goats and are often attacked by mountain sickness in the higher altitudes. No heavy loads can be carried over these passes, so that the goods exchanged between India and Tibet are necessarily light.

Lakes and Rivers

There are few lakes of any importance throughout the system, the chief being the Palti or Yam-rök with a circuit of 46 m., which lies N. of Sikkim. The snow-line on the southern face is found at 16,300 ft., while on the northern or Tibetan side it is 17,400 ft. Some of the extensive glaciers, however, descend to as low a level as 11,000 ft. The principal rivers taking their rise from the melting snows of this gigantic rampart are the Ganges, Indus, Jumna, Sutlej, and Brahmaputra, besides hundreds of minor streams. Nearly all these streams carry down tremendous loads of alluvium which have served gradually to build up the stoneless Indo-Gangetic plain, and which now add greatly to the productivity of the areas irrigated from the numerous canals of the Punjab and the United Provinces.

Tropical vegetation may be found up to a height of 3,000 ft., and includes giant rhododendrons, acacias, orchids, palms, and ferns, while tea and cinchona are cultivated. Oaks and chestnuts flourish for another 4,000 ft., after which pine, poplar, spruce, fir, birch, and willow follow to the limit of the tree-line, which on the Tibetan slopes is about 14,000 ft.

Animal life is varied and abundant. The tiger, leopard, monkey, many kinds of deer, goat, bear, wolf, rhinoceros, horned sheep, boar, ounce, marmot, flying squirrel, wild cat, and yak are all found. The birds, which include many varieties of pheasant, are numerous, with many of gorgeous plumage. Insects are numerous and troublesome, particularly during the summer rainy season.

A healthy climate prevails in the outer Himalayas, and under the British raj sanatoria and hill stations were established at various places, e.g. at Darjeeling (alt. 7,346 ft.), Simla (alt. 7,500 ft.), long the summer residence of the viceroy, Dalhousie (alt. 7,700 ft.), and Naini Tal (alt. 6,410 ft.).

The prevailing rocks are granite, crystalline gneiss with mica schist, with intrusions of trap. Sedimentary deposits and fossil marine remains have been found at an alt. of over 20,000 ft. The Siwalik Hills may be a later uplift, while parts of the system west of Assam are deemed to have been repeatedly submerged and thrown up again.

The Himalayas are the eastern end of a great series of folded mountains, uplifted in Tertiary times, which terminates in Spain on the W., and forms the backbone of Eurasia. When the ancient continent of Gondwanaland broke up towards the end of the Cretaceous period, great volcanic activity occurred in the Deccan, the sole Asiatic relic of Gondwanaland, and a great crumpling of the earth's crust slowly produced the Himalayas, and upraised the great plateau of Central Asia.

Climbing Himalayan Peaks

Mountaineering in the Himalayas began in 1855 when the brothers Schlagintweit reached 22,329 ft., on a subsidiary peak of Kamet. Sir Joseph Hooker, the botanist, in 1849 climbed in the Sikkim Valley. Pundits of the survey of India (notably Sarat Chandra Das who crossed the Jonsong La, 20,000 ft.), Godwin-Austen, Graham, Conway, Freshfield, and the Bullock Workmans (husband and wife) were among the pioneers.

A. M. Kellas distinguished himself by many climbs in the neighbourhood of Kinchinjunga in the decade before the outbreak of the First Great War. In 1921 he resumed climbing to conquer Narsingh; he died in the first Everest expedition in the same year. His grave is at Kampa Dzong (14,000 ft.). Smythe described Kellas as the greatest pioneer of Himalayan mountaineering from the technical point of view of route-finding and mountaineering.

In 1931 F. S. Smythe climbed Ibi-Gamin (Kamet) (25,447 ft.), first peak over 25,000 ft. surmounted. In 1934 H. W. Tilman and N. E. Odell climbed Nanda Devi (25,645 ft.). Everest, many times attempted, was conquered May 29, 1953, by Edmund Hillary and Sherpa Tensing. Expeditions in which Swiss, Italian, German, American, Polish as well as British climbers have engaged have covered other regions of the Himalayas. In 1928 the Himalayan Club was founded to encourage Himalayan travel and exploration. Its journal is published annually by the Oxford University Press.

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Himeji. Harbour of Honshu, Japan, capital of the prov. of Hyogo. It stands at the junction of three important highways, 34 m. by rly. N.W. of Kobe. The 14th century "Heron Castle" is still in a good state of preservation. The town is important in the coasting and inland sea trade. Himeji is noted for its stamped leather work and manufactures cotton goods. Pop. (1950) 212,100.

Himera. Greek city of ancient Sicily. It is situated on the N. coast at the mouth of the river of the same name (now called Salso). Here a great Carthaginian army was completely defeated by the Sicilian Greeks under Gelon and Theron in 480 B.C. on the day of the great Greek naval victory over the Persians at Salamis. In 409 the city was destroyed by the Carthaginian general, Hannibal, son of Gisco.

Himley Hall. Mansion near Dudley, Worcestershire, England, the headquarters of the West Midlands coal board. For many years the home of the earls of Dudley, its history goes back to the 14th century, though the building purchased in 1947 for £45,000 by the coal board was of the 18th cent.

Himmler, HENRICH (1900-1945). German Nazi administrator. The son of an R.C. school-



Heinrich Himmler, Nazi administrator

master, he was born in Munich, Oct. 7, 1900. In 1917 he went to an O.T.C., but saw no active service; after the war he worked as an insurance agent and as a small farmer. He took part in Hitler's *Putsch* in 1923, becoming a fanatical adherent of the doctrine of the German master-race. In 1929 he was appointed leader of the S.S. (Black Guard), which he built up from a personal bodyguard for Hitler to a powerful political weapon; later he formed the Waffen-S.S. as a check on the power of the army. In 1933 Hitler

made him police chief of Bavaria, and in 1936 of the whole of Germany, in which capacity Himmler used the Gestapo and the concentration camps ruthlessly to bring virtually every individual in Germany within his power. He was the moving spirit behind the "blood bath" of June 30, 1934, in which Roehm, Heines, and many others were murdered.

On Aug. 24, 1943, Himmler became minister of the interior, and on July 21, 1944, c.-in-c. of the home army and supreme controller of the munitions industry. When to these offices he added in Oct., 1944, the command of the Volkssturm, he was supreme in Germany. Henceforth all edicts bore his signature, and he suppressed defeatism mercilessly. When the German armies were beaten he met Count Bernadotte of the Swedish Red Cross at Lübeck, April 24, 1945, in an attempt to induce Great Britain and America to sign a separate peace. Failing in this, he went into hiding, but was arrested by British 2nd army troops at Bromervörde, May 21, 1945, and two days later took poison while being held at Lüneburg, dying the same day.

Himyar (Semitic, red people). An ancient tribe in S.W. Arabia. Wrestriving the S. Arabian hegemony from the Sabaeans about 100 B.C., they established a dynasty under which they influenced for several centuries the Abyssinian kingdom of Aksum, until the Mahomedan conquest. The culture and speech of the sedentary Semites of Yemen, formerly called Himyaritic, is now called generically S. Arabian, and specifically Himyarite, Minacan, and Sabacan.

Hinayana (Skt., little vehicle). The term used by some modern Oriental scholars to denote primitive Buddhism. It serves to distinguish the early doctrinal system, with its arid ethics, agnosticism, and hard asceticism, from the more tolerant Mahayana (great vehicle) of later Indian Buddhism, with its humaner elements, speculative theism, and ritual attractions. Used by some early Sanskrit writers as a term of abuse, it is rarely found in modern India. Its equivalent is sometimes applied, in China and Japan, to elements derived from the earliest missionary teaching, which was based upon the Pali rather than on the Sanskrit texts.

The word is traced back to the Chinese pilgrim Fa-hien, who travelled in the Buddha cradleland early in the 5th century. In that

age a Hinayanist was regarded as a member of one of the primitive schools of Buddhist thought. Of these there were commonly said to be 18, but there were actually more, although three or four only were at any time of wide influence. These schools were not sects but modes of thought, comparable with the broad and high forms of contemporary Anglicanism. They arose between the councils of Vaisali and Pataliputra, 400-250 B.C., and as late as the 7th century A.D. the Chinese pilgrim Yuan Chwang estimated that, of the 200,000 monks then in India, at least two-thirds adhered to the primitive schools. It is on their foundation that the Buddhism of Ceylon, Burma, and Siam arose, although these areas did not remain untouched by Mahayana influences. These, with their worship of Bodhisattvas, or potential Buddhas, and their incorporation of local animistic beliefs, found a sympathetic home in China, Tibet, and Japan. See Buddhism.

Hinchinbrook. Island off the coast of N.E. Queensland, Australia. S. of Rockingham Bay, it is separated from the shore of Cardwell co. by a narrow channel, and its S. point faces the headland of Dungeness. The island contains Mt. Hinchinbrook.

Hinchingbrooke. Village of Hunts, England, just outside the town of Huntingdon. It is famous because here is Hinchingbrooke House, once the residence of the Cromwell family. It was given to the Cromwells after the dissolution of the monasteries, and here one of them built a fine mansion in which Elizabeth I and later James I were entertained. They kept the estate until 1627. The house later became the property of the earls of Sandwich, whose eldest son bears the title Viscount Hinchingbrooke.

Hinckley. Market town and urban dist. of Leicestershire, England. It is 14 m. S.W. of Leicester, with a rly. station. The chief building is the restored Gothic church of S. Mary. There is a free library and a grammar school. The chief industries are the manufacture of hosiery, boots and shoes, and bricks. Five m. N. lies the site of the battle of Bosworth (*q.v.*). Watling Street runs near here, and the place was once a Roman station, many Roman remains having been found near. Market day is Monday. Pop. (1951) 39,088.

Hincks, EDWARD (1792-1866). Irish Orientalist. Born at Cork, Ireland, Aug. 19, 1792, he graduated at Trinity College, Dublin,

and became Protestant rector of Killyleagh, co. Down, 1825. He made solid contributions to the decipherment of cuneiform script and Egyptian hieroglyphics. His *First and Second Kinds of Persepolitan Writing*, which determined the ancient Persian vowel system, appeared in 1846 simultaneously with Rawlinson's solution, achieved independently at Bagdad. He died at Killyleagh, Dec. 3, 1866.

Hindemith, PAUL (b. 1895). A German composer. Born at Hanau, Nov. 16, 1895, he studied at Frankfurt-on-Main under Arnold Mendelssohn. From 1915 to 1923, he first led, then conducted the opera there. A brilliant viola player, he performed with the Amar quartet, and toured Europe for some years.

Hindemith originated the term *Gebrauchsmusik* (utility music) to describe many of his neo-classic compositions, *e.g.* his opera *Sankta Suzanna* (1922) and orchestral works in the same idiom. His later compositions showed a romantic development. One of the most important composers of his time, his chief works (apart from his operas) included the string quartet *Kammermusik I*, and *Kleine Kammermusik* (for wind quartet), two viola concertos, the Philharmonic concerto, ballet music for *Nobilissima Visione*, and *American Requiem*. His work was stigmatised as "decadent" by Goebbels, and he became a target of Nazi propaganda. After completing his opera *Mathis der Maler* in 1934, he went to the U.S.A., where he was appointed professor of music at Yale university.

Hindenburg. German airship. The largest aircraft ever constructed when it was launched in March, 1936, the *Hindenburg* or L.Z.129 was 972 ft. long, 162 ft. in diam., weighed 110 tons, and had a gas capacity of 6,720,000 cu. ft. It was placed in regular service between Frankfurt and Lakehurst, N.J., the terminus for New York, and on one voyage carried 127 people. On arrival at Lakehurst, May 6, 1937, the airship caught fire and was totally destroyed, with a loss of 33 lives.

Hindenburg. Name 1915-45 of a town of Silesia. See under its Polish name Zabrze.

Hindenburg, PAUL VON BENECKENDORFF UND (1847-1934). German soldier and statesman. Born Oct. 2, 1847, at Posen (Poznan), he was educated at a military college, served as a guards officer in the wars of 1866 and

1870-71, rose slowly until he commanded the 4th corps, 1903-11, when he retired.



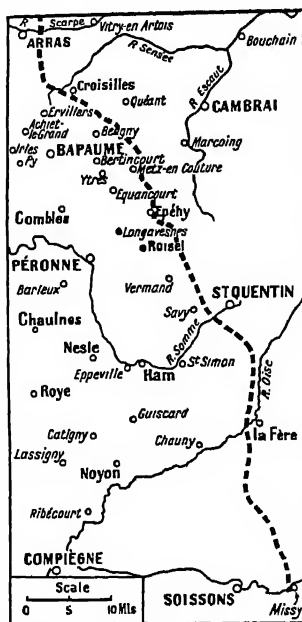
Paul von Hindenburg, German soldier and statesman

He was recalled to service when the Russians invaded East Prussia in 1914, defeating them at Tannenberg, Aug. 23-30, and the Masurian Lakes, Sept. 5-15. He was made field marshal Nov. 27, and re-

mained German generalissimo in the E. until Aug. 1918, when he succeeded Falkenhayn as chief of the general staff. In fact, Hindenburg was c.-in.-c. of the German forces, and with Ludendorff directed the policy of the Reich, being responsible for the U-boat war, the dismissal of Chancellor Bethmann-Hollweg, the Brest-Litovsk peace, and the labour conscription programme, until he sued for an armistice after the collapse of the last German offensives in 1918.

Hindenburg remained in command of the German forces in co-operation with the republican government, until July 3, 1919, when he retired once more, wrote his memoirs (*Out of My Life*, 1920), and abstained from politics until in 1925 he agreed to stand for the presidency and was elected. He did not interfere with the process of constitutional government, and in 1932 was re-elected president, his opponents being Hitler and the Communist Thälmann. Despite his personal disdain and dislike for Hitler, Hindenburg was prevailed upon by his entourage to appoint him, January 30, 1933, chancellor of a coalition government, with Papen as vice-chancellor. Senile and ailing, Hindenburg scarcely realized, and was unable to interfere with, the dictatorial regime subsequently set up by brute force. Necessary documents and statements extracted from him by guile included "approval" of the purge of June 30, 1934. He died Aug. 2, 1934, at Neudeck. *Consult* Lives, E. Ludwig, 1935; Gert von Hindenburg, 1935.

Hindenburg Line. German fortified system, built after the 1918 battle of the Somme between Arras and the Chemin des Dames, protecting Cambrai, St. Quentin, La Fère and Laon by lines of trenches strengthened by concrete shelters and gun emplacements. It was used for a sudden



Hindenburg Line. Map showing the extent of the German fortified system built in 1918

withdrawal from advanced positions early in 1917, when the German c.-in.-c. undertook his "knock-out blow" against Russia. Its main, southern part, into which the German forces withdrew in mid-March, 1917, after destruction of the whole area west of it, was officially described as the Siegfried line.

Hindhead. Eccles. and residential district, hill, and common of Surrey, England. It is on the Portsmouth Road, 2 m. N.W. of Haslemere. John Tyndall called Hindhead (854 ft.) the next best place to the Bel Alp, but Cobbett found it a forbidding place. On Gibbet Hill, 895 ft., was the gallows on which the murderers of an unknown sailor, Sept. 24, 1786, were hanged in chains. Near by is the glen called colloquially the Devil's Punch Bowl (*q.v.*).

HINDUISM: INDIA'S CHIEF RELIGION

T. Wiltton Davies, former Prof., University College, Bangor

Further information about the Hindus is given in the article on India. See Brahmanism; Vedas; also Devi; Sati, and other deities; Saktas; Swailes; Thugs

Hinduism is a term used for the new Brahmanism which came into being in India after the decline and banishment of Buddhism from that country. Modern Brahmanism, or Hinduism, is a conglomeration of original Brahmanism, of Buddhism, and of elements from other cults, especially those of the aborigines

(Dravidians, etc.). But two things remain as prominent in Hinduism as in Brahmanism—the supreme position of the Brahman, and the rigid observance of caste. The Vedas and the Brahmanas are still regarded as the ultimate authority in religion, though the former are little read and exercise

Excepting Leith Hill, Hindhead and its neighbour, Blackdown, 918 ft., are the highest points of the Greensand ridge, which here abuts upon the Wealden plain. The Wey rises to the S. on Blackdown, circles around Hindhead on the W. and N., and receives 8 small streams which radiate from the plateau; the most notable flows from the Devil's Punch Bowl. The Portsmouth Road runs just below the plateau edge.

Hindle. For this language of India see Hindustani.

Hindle Wakes. Play by Stanley Houghton, dealing with life, morals, manners, and character as displayed in a Lancashire cotton town, Hindle, following "wakes" week. First produced at the Gaiety Theatre, Manchester, by Miss Horniman, in 1912, it was seen in London the same year. It has been more than once revived, twice filmed, and frequently broadcast.

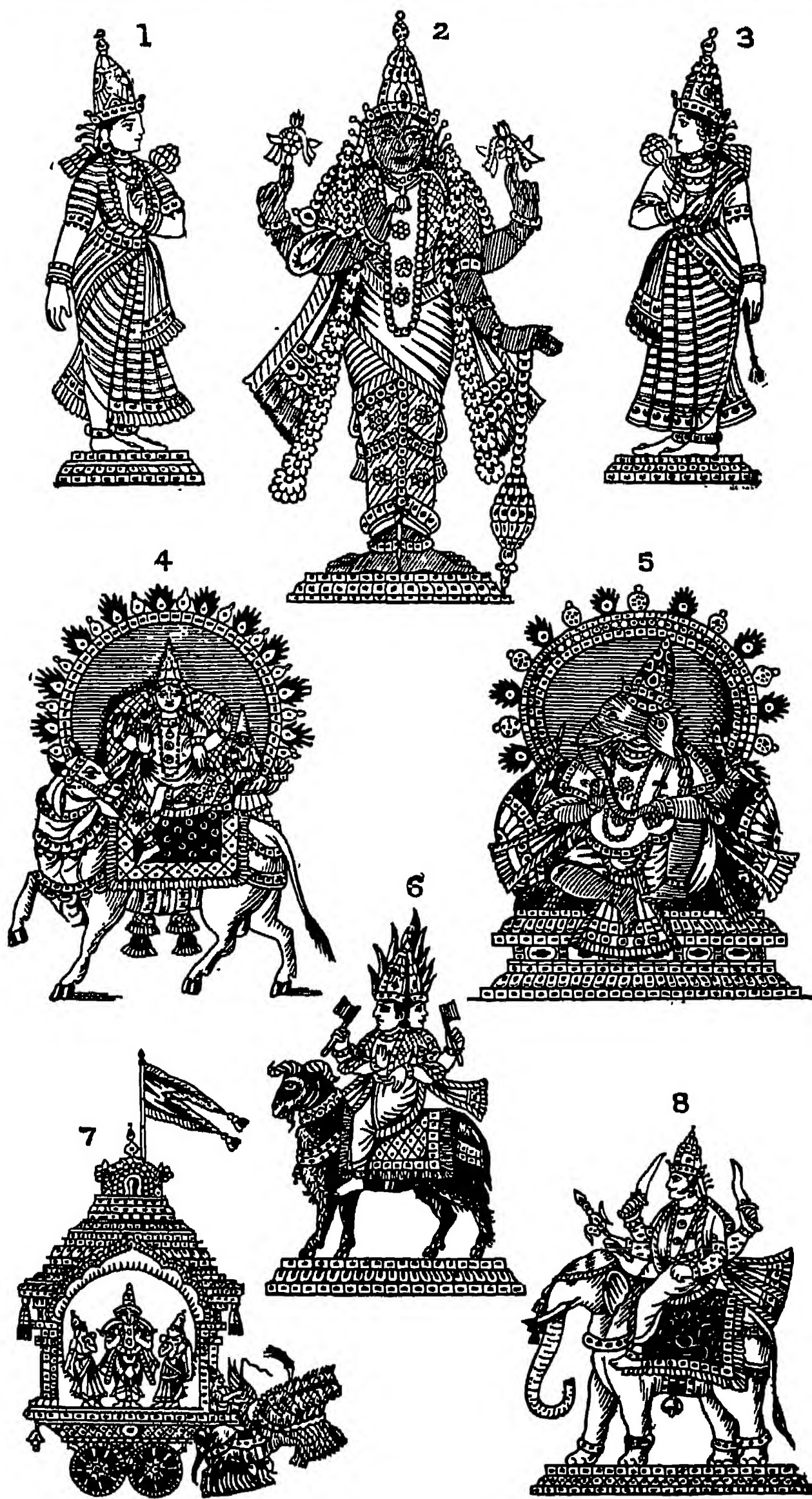
Hindley. An urban dist. and parish of Lancashire, England. It is 2½ m. by rly. S.E. of Wigan. The chief industry is cotton manufacture. The council owns the water supply, and the markets. Pop. (1951) 19,414.

Hindø. Island off the N.W. coast of Norway. The largest of the Lofoten and Vesteralen Islands, its area is 863 sq. m. Its coast-line is deeply indented by fjords and is partly wooded. Harstad is the chief of several harbours. Here are hotels, an ancient church, and a Lapp encampment. Lødingen is a fishery station on Vost fjord.

Hindu. General name for the inhabitants of the Republic of India. In a narrower sense, the Hindus are that part of the population of Aryan origin which in prehistoric times migrated from the north-west into the Ganges district, and thence spread over the south. Their chief representatives today are the Brahmins and Rajputs.

(Dravidians, etc.). But two things remain as prominent in Hinduism as in Brahmanism—the supreme position of the Brahman, and the rigid observance of caste.

The Vedas and the Brahmanas are still regarded as the ultimate authority in religion, though the former are little read and exercise



Hinduism. Art applied to the representation of gods and goddesses. 1. Lakshmi, goddess of prosperity. 2. Vishnu, one of the principal Hindu deities. 3. Saraswati, goddess of learning. 4. Siva the Destroyer, second of the Hindu deities. 5. Ganesha, god of success. 6. Agni, a guardian deity. 7. Surya the Sun god. 8. Indra, king of heaven

but slight influence upon the religious beliefs and practices of the people. Even the Brahmanas are much less studied and followed than in pre-Buddhist days. Though the two great Indian epics belong in their original form to the Brahmanic age, they have been so modified and adapted to later times as to become text-books of Hinduism as well as of Brahmanism.

The Vedanta Sutas, or aphor-

isms, belong in their present form to about A.D. 700. The doctrine which they teach is the impersonal pantheism of the Upanishads. This may be regarded as the standard work of Hindu philosophy. The Eighteen Puranas (mythological treatises) are very much read by the common people, and in particular by women. They repeat the cosmogonies of the two epic romances and give in greater

detail the mythological legends about Siva and especially Vishnu. They have much to say about the worship of these two gods and constitute the principal source and authority for modern Hinduism.

The Tantras (literally threads, then fundamental doctrines) are dependent on the Puranas, as the latter are upon the two great epics. The Tantras are manuals of religion, of magic, of counter-charms, etc., with the addition of hymns in praise of Sakti, the female counterpart of Siva. They are of late date, some no older than the 18th century. They are the product of Sivaism in its most revolting form. There exist an immense number of religious hymns called Stotras which are sung privately, in families, and by large gatherings of Hindus. These have a considerable influence upon the popular mind. The Ramayana of Tulasi Dasa in N. India in praise of Rama, belonging to the 16th century A.D., and the productions of the Tamil poet Tiruvalluva Kural, are widely read.

Theoretically the gods of the Vedas are those of Hinduism, but in practice Vishnu and Siva and those they represent are the only deities actually worshipped and acknowledged. Indra, the supreme god of the Vedas, receives hardly any notice, and the same is true of Agni, Varuna, Soma, and others. The Hindu Puranas recognize what is called the Trimurti, the three forms, which includes the trinity of gods, Brahma, Vishnu, and Siva. But the first, the shadowy continuation of the Vedic god of that name, is almost ignored in modern Hinduism. For an understanding of the Hinduism of to-day one has to take into account only the other two gods and the gods and goddesses who follow in their train. It is one outstanding feature of Hinduism, especially in its Sivaic section, that it invented a large number of goddesses. Vedism had hardly a place for female deities.

The predominant philosophy in Hinduism is Vedantism as represented in the Vedanta Sutas. Cultured Hindus regard all the deities of modern India, and many of them include the Gods of the Jew, the Christian, and the Moslem, as mere forms and manifestations of the Great All, the One and No Other. Among the Sivaites, however, the dualism of the Sankhya philosophy has considerable vogue.

At least three-fourths of the population of modern India belong ostensibly to one or other of the two great sects, the Vishnuites or the Sivaites. Though a very subordinate god in the Vedas, Vishnu

reaches the highest place among gods in the Puranas. All Vishnuites worship Vishnu or one of his ten or more incarnations. They are strongest in middle India. There are two Vishnuite sects, the Krishnaites, the more numerous though the less intellectual, who regard Krishna, and the Ramaites who regard Rama, as the principal Avatar or Incarnation of Vishnu. The Ramaites are themselves split up into two leading parties: (1) those who hold the "cat-doctrine," as it is called in the sacred books, i.e. believe that God saves a man as a cat takes up its helpless kitten and carries it out of danger; (2) those who support the monkey theory, that in order to be saved a man must lay hold of God as a young monkey does of its mother.

The Sivaites worship as their supreme deity Siva (the propitious one), the modern representative of the Vedic Rudra, the destroyer, except that Siva is regarded as the preserver as well as the destroyer of life. The headquarters of Sivaism are the extreme north and the southern part of India. Siva's symbol is the linga (*phallus*), generally accompanied by the *yoni* and often by the figure of an elephant. These were perhaps intended originally to represent the god as the producer of the world, and in the minds of many devout Hindus no other conception is present. Siva's consorts play an important and sinister part in this cult. They are all supposed to be the one consort of Siva, under various names and with correspondingly different attributes: Devi, or the Goddess; Durga, the unapproachable; Kali (*cf.* Calcutta), the black one; Gawri, the bright one; Sati, the faithful one; Parvati, the daughter of the mountain; Bhavair, the terrible one; and Karali, the horrible one.

The principal subdivisions of the Sivaites are the Saktas and the Thugites. The first get their name from Sakti, the female principle. In reality, the Saktas worship Siva on his female side and practise indescribable obscenities as a part of their religion. Their bible is the Tantras. The Thugites profess to worship the female principle under the name Kali. Besides being guilty of the sexual obscenities of the Saktas, they make murder a part of their religion. They have, indeed, a doctrine that no blood should be shed, but parry this by throttling their victims.

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1891; Hinduism Past and Present, J. M. Mitchell, 1897; Hinduism and Buddhism, Sir C. Eliot, 1921; Popular Hinduism, L. S. O'Malley, 1935; Epics, Myths, and Legends of India, P. Thomas, 1942.

Hindu Kush (anc. *Paropamisus*). Extensive mountain range of Central Asia. It extends from the Pamir mountain knot in a S.W. direction, as far as lat. 34° 30' N. and long. 67° 40' E. The range lies partly in Afghanistan, separating Badakshan on the N. from Kafiristan on the S., and has many peaks exceeding 20,000 ft., the loftiest being the Tirach Mir, 25,400 ft., dominating Chitral. The W. part of the range is not so stupendous as the N. and E., and the snow-line lies at 13,500 ft. It has a length of some 500 m. From Tibet to the Dorah Pass, c. 200 m., the range provides a virtually impregnable frontier for India. The Amu-Daria has its source in these mountains, from which many tributaries of the Kabul river, the Chitral, Panjshir, etc., originate. The valleys of these streams give Kabul its strategic importance. The rocks are mainly granite, gneisses, and schists of various kinds, while sedimentary deposits indicate that the mass was upheaved in late Tertiary times.

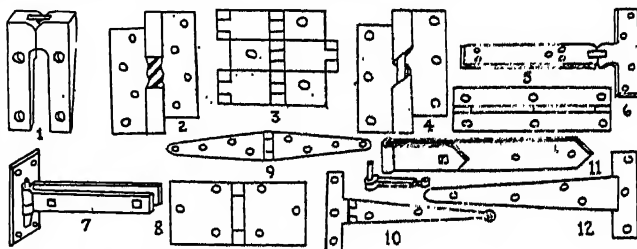
Hindus, MAURICE GERSHON (b. 1891). Russian-born American writer. Born Feb. 27, 1891, he went to the U.S.A. in 1905. He was educated at Colgate university and Harvard. From 1923 he frequently visited the U.S.S.R., and his publications dealt mainly with social and political problems there, e.g. *The Russian Peasant and Revolution*, 1920; *Humanity Uprooted*, 1929; *Moscow Skies*, 1936; *Russia and Japan*, 1942; *The Cossacks*, 1948.

Hindustan OR HINDOSTAN (Pers., land of the Hindus). Name applied to the Indian peninsula, but more correctly to the Gangetic basin, and the country N. of the Vindhya Mts. See India.

Hindustani. Name given by Europeans to an Aryan language which has two forms: Urdu, based on Persian and Arabic, with a Persian script written from right to left; Hindi, based on Sanskrit, with Devanagari script written from left to right. About 150 million people in the Indian sub-continent use this language in one or other of its forms. Urdu is more common in the N. and N.W.; Hindi in and about the Ganges valley. Urdu, meaning the language of the camp, originated in the headquarters of the Great Mogul near Delhi. The Indian govt. decreed in 1949 that in 15 years Hindi (with the Devanagari script) should be the official language of the Indian union. See Devanagari.

Hinge. Device consisting of plates, bars, or flaps pivoted upon pins, on which they turn relatively to each other. In ordinary types there are two flaps. Hinges are usually made of cast iron, wrought iron, steel, or brass.

The following are some of the principal patterns: butt hinges, as used for doors; rising butts, in which the two flaps bear upon each other at an angle where they hinge on the pin, so that a door to which one flap is secured rises as it opens, and its weight upon the tapered seating causes it to close automatically; tee hinge, with one long tapered flap and one short flap; box hinge, with two long tapered flaps of which one is sometimes bent at right angles and flap bracket hinge, with three flaps and two pins at right angles to each other. One flap is screwed to a support, another to a board, and the third forms a bracket which can be hinged out sideways to support the board when hinged outwards from a wall. There are also the folding screen hinge, by means of which a screen may be folded either way; spherical gate hinge, with one long bar-flap hinging about a pin, but bearing upon a cup filled with grease or



Hinge: various types. 1. Card table. 2. Screw butt. 3. Screen. 4. Rising butt. 5. Wrought tumbler. 6. Piano. 7. Wrought double strap. 8. Backflap. 9. Strap. 10. Wrought cross garnet. 11. Field gate. 12. Scotch tee.
Courtesy of "Specification"

oil; and self-closing gate hinge, with a pair of vertical pivots which serve as a bottom hinge for heavy gates. When the gate is closed, both pivots bear in sockets on the gate-post; when opened, all the pressure is sustained on one pivot only, and the bias thus set up causes the gate to close automatically.

Hinkler, HERBERT JOHN LOUIS (1892-1933). Australian airman. Born at Bundaberg, Queensland, Dec. 8, 1892, he was experimenting with gliders in 1911, and served in the R.N.A.S. during the First Great War. In 1928 "Bert" Hinkler achieved the first solo flight in a light aeroplane from England to Australia, taking 15 days. In 1931 he set up a new record by flying in a Puss Moth from New York to London, via Brazil, including a 2,000-mile crossing of the Atlantic. On Jan. 7, 1933, he set out from England for Australia, but was killed when his machine crashed near Arezzo in the Apennines.

Hinnom. Valley of Palestine, S.W. of Jerusalem. It was largely used for burning refuse, and was known as Gehenna. Much of the symbolic language of the Bible about hell has reference to this place. See Hell.

Hinsley, ARTHUR (1865-1943). British cardinal. He was born at Carlton, near Selby, and passed from the college at Ushaw to the English College in Rome, London university, and the Gregorian university. Professor at Ushaw, 1893-97, and headmaster of S. Bede's grammar school, Bradford, 1899-1904,



Arthur Hinsley,
British cardinal

he became pastor of Sutton Park, and then of Sydenham. In 1917 the pope chose him as rector of the English College in Rome and one of his domestic prelates. As bishop of Sebastopolis *in partibus*, Hinsley was dispatched in 1928 to Africa as apostolic visitor, with the task of securing the cooperation of R.C. missionaries in the Colonial office scheme of educational reform. In 1930 he was created titular archbishop of Sardes and apostolic delegate in Africa; but in 1934 ill-health forced him to resign. A canon of S. Peter's, in 1935 he became archbishop of Westminster on the death of Cardinal Bourne, and received the red hat in 1937. He fearlessly

denounced tyranny and aggression in Abyssinia, Italy, Germany, and Russia; and in 1940 formed a society called The Sword of the Spirit, a spiritual mobilisation of R.C.s against evil things, especially as exemplified in the totalitarianism of the Axis powers. He died March 17, 1943.

Hinterland (Ger.). A term generally used to denote the land behind coastal belts. It came into general use in England in connexion with the European occupation of parts of the W. African coast. The term is technically used in economic geography for the region or regions which lie behind a port or group of ports through which they ship the bulk of their goods and receive the greater part of their supplies.

Hip-joint. Enarthrodial or ball and socket joint in the body, the ball being the rounded head of the femur, or thigh-bone, and the socket being the cup-shaped hollow, or *acetabulum*, on the outer side of the pelvis. It is a strong joint, surrounded by tough ligaments, and permits of a considerable range of movement of the thigh in every direction.

Dislocation of the hip-joint can sometimes be congenital, i.e. present from birth, and may affect both limbs. The condition is frequently unnoticed until the child begins to walk, when it causes deformity. The defect may sometimes be cured without an operation, the head of the femur being replaced in its socket, and the limb immobilised in plaster of Paris for two or three months. In other cases an operation is necessary. Dislocation of the hip from violence is rare, owing to the strength and security of the joint. The head of the femur may be displaced from its socket either forwards or backwards; reduction is often difficult, and the movements to effect it are complex. After reduction, the legs should be kept tied together for a fortnight, and the patient should not attempt to walk for a month.

The hip-joint is not infrequently the seat of chronic tuberculosis in young children. The child complains of pain in the hip-joint or in

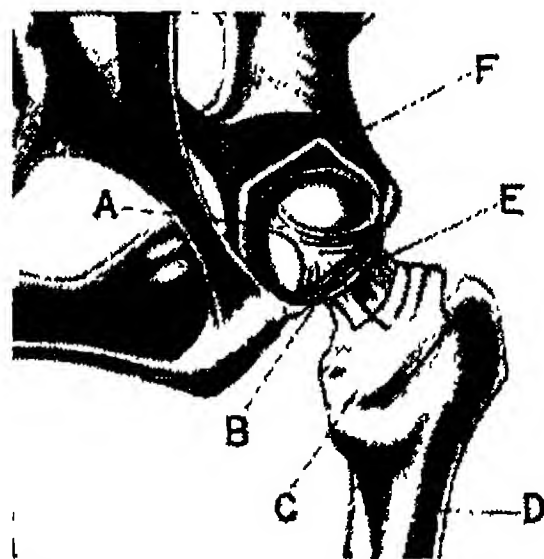
the inner side of the knee, and may be observed to limp. There is slight wasting of the muscles of the thigh, and the affected leg appears a little longer than the sound limb. As the disease progresses, the wasting becomes greater, the pain increases, and the leg appears shortened, owing to the tilting up of the pelvis, producing a marked deformity and limp. Abscess formation is likely to occur, and the pus may burrow through the muscles, and discharge through the skin. In the advanced stage there is erosion of the head of the femur, and real, permanent shortening of the limb. The patient may develop tuberculosis in other parts of the body and die.

If the case is treated early the outlook is hopeful, though there will probably always be some crippling of the limb. In the early stages the joint should be given

complete rest by keeping the child in bed, any deformity being corrected by appropriate splints or by extending the leg by weights attached to a cord carried over a pulley at the end of the bed. When the acute symptoms and pain have abated, the child is allowed to get about on crutches and a Thomas's splint, which should be worn for six

months. Nourishing food and plenty of fresh air are of the greatest importance, and residence in the country or at the seaside is beneficial. In severe cases which are not progressing favourably surgical treatment may be indicated. Other affections of the hip-joint are acute and chronic arthritis (rheumatism), and Charcot's disease, a serious disorganization of the joint which may occur in the course of syphilis. See Dislocation; Tuberculosis.

Hipparchus (fl. c. 146-126 B.C.). A Greek astronomer. Born at Nicaea in Bithynia, he chiefly carried out his observations in the island of Rhodes and in Alexandria. His only extant work is a Commentary on the Phaenomena of Eudoxus and Aratus. Hipparchus's title to fame rests upon his catalogue of 1,080 stars, revised by Ptolemy in his Almagest (q.v.). He determined the length of the



Hip-joint. Anatomical diagram of the ball and socket joint. A. Ligamentum teres. B. Acetabulum ligament. C. Capsular ligament, turned back. D. Femur or thigh-bone. E. Cotyloid ligament. F. Acetabulum removed

solar year, discovered the precession of the equinoxes, and calculated the eccentricity of the sun's orbit. He invented trigonometry and the method of fixing terrestrial positions by means of circles of latitude and longitude.

Hipparion (Gr., pony). One of the fossil ancestors of the horse. Remains have been found in Upper Miocene rocks of N. America and the Pliocene deposits of Europe, Asia, and N. Africa. Smaller than our horse, its average height was 4 ft. (12 hands). See Fossils.

Hipper, FRANZ VON (1863-1932). German sailor. Born Sept. 13, 1863, he entered the navy in 1881, and commanded the raid on Scarborough and Hartlepool in 1914. He took part in the battle of the Dogger Bank, and at Jutland, as commander of the cruiser squadron, inflicted serious damage on Beatty's battle cruisers. In Aug., 1918, he was appointed c-in-c. of the German fleet, but after the mutiny and the surrender to the Allies he went into retirement. One of his country's outstanding naval officers, he died May 25, 1932. His name was later given to a class of German heavy cruisers. A biography by H. von Waldeyer-Hartz, trans. F. A. Holt, appeared in 1933.

Hippias. A Greek sophist, a native of Elis and contemporary of Socrates (5th century B.C.). Famous for his extensive knowledge and remarkable memory, he regarded law as opposed to nature and driving man to act contrary to his natural instincts. He gives his name to two dialogues of Plato.

Hippias and Hipparchus. Sons of Peisistratus, and tyrants of Athens (6th century B.C.). See Harmodius and Aristogiton.

Hippo or **HIPPO REGIUS**. Ancient city of N. Africa, which occupied the site of the present Bône, Algeria. Founded by the Phoenicians, it was a favourite residence of the Numidian kings. Under Rome, Hippo Regius flourished as a trading centre, and became the see of Augustine, who died here in 430. On the advent of Christianity the Roman temples, theatres, and palaces were turned into churches and monasteries. Hippo was sacked by the Vandals and utterly destroyed by the Muslims in the 7th century.

Hippocras. Old English cordial made from spiced wine, sugar, lemon, and other ingredients. The wine, with ginger and cinnamon, was strained through woollen cloths or sieves, known to apothecaries as the sleeves of Hippocrates.

Hippocrates (b. c. 460 B.C.). Greek physician, called the father of medicine. The son of an Asclepiad, a family of priest-physicians practising the cult of Aesculapius, he was born in Cos and studied medicine there; travelled widely, practising in Thrace and possibly in Athens; and is said to have died at a great age in Larissa. He was an acknowledged master in his lifetime, and his oath of service and the Hippocratic ethic established a standard of professional ideals still accepted. He was both physician and surgeon, though as surgeon he was hampered by Greek objections to dissection. Writings by him or his school include *Regimen in Acute Diseases*; *Epidemics*, which contains clinical histories that are models of their kind and were unique for 2,000 years; and *The Sacred Disease*, a study of epilepsy. *Consult* Text and trans. ed. W. H. S. Jones, 4 vols., 1923-31; *Medical Works*, Eng. trans., Chadwick and Mann. 1951 *Pron.* hip-pock-rat-eez.



Hippocrates, Greek physician
Bust in British Museum

Hippodrome (Gr. *hippos*, horse; *dromos*, running, course). Course for chariot or horse racing in ancient Greece. It was oblong in shape with rounded ends. In modern terminology the word, regardless of etymological associations, has come to be frequently applied to a theatre giving a variety entertainment. See Amphitheatre; Circus.

Hippodrome, THE LONDON. Variety theatre in Cranbourn Street, W.C. Designed by Frank Matcham, it was built in 1899 with special arrangements for converting the stage into a circus arena, or a large water tank. It was opened for spectacular entertainment by H. E. Moss in 1900. Reconstructed in 1909, it became celebrated for its productions of musical comedy and revue.

Hippogriff. Fabulous animal, half horse and half griffin. The name is sometimes applied to a fabulous winged horse.

Hippolytē. In Greek legend, queen of the Amazons. She wore a

famous girdle, the gift of her father Arēs, to obtain which was one of the twelve labours of Hercules. Refusing to give it up, she was slain by him. According to another legend, Hippolytē invaded Attica at the head of her Amazons, but was defeated by Theseus and became his wife. *Pron.* Hip-polly-tee.

Hippolytus. In Greek legend, son of Theseus. He rejected the advances of his stepmother, Phaedra, who thereupon took her own life, leaving a letter to Theseus in which she accused Hippolytus as the offender. Theseus, in his anger, called upon Poseidon to destroy his son, whereupon the god sent a sea-monster which frightened the horses of Hippolytus, who was thrown and killed. He was restored to life by Aesculapius and afterwards ruled, under the name of Virbius, in the grove of Egeria near Aricia. The tragedy is the subject of Euripides' drama *Hippolytus* and of Racine's *Phèdre*. See Phaedra.

Hippolytus, ROMANUS (d. c. A.D. 240). Eccles. writer who is said to have been bishop of the port of Rome. He was pupil of Irenaeus and active in the times of the popes Zephyrinus (202-218) and Callistus (218-223). He wrote in Greek, and is regarded as the author of a work entitled *Philosophoumena*; or, *Refutation of all Heresies*, once attributed to Origen, and aimed especially at the Gnostics. On a marble statue, unearthed at Pontus in 1551, and supposed to represent Hippolytus, was found engraved a list of his works, including the *Philosophoumena*, part of the MS. of which was found at Mount Athos 1842, and published in England 1851. *Consult* Hippolytus and Callistus, J. J. I. Dollinger, 1853, Eng. trans. 1876.

Hippolytus, CANONS OF. Thirty-eight rules or orders attributed to Hippolytus, bishop of Rome. Existing only in an Arabic translation from a Coptic version of the original Greek, they are valuable for the sidelights they throw on the early life of the Christian Church.

Hippophagy (Gr. *hippos*, horse; *phagein*, to eat). Practice of eating horseflesh. An enormous mass of fossil bones found at Solutré in the Rhône valley supports the view that in Palaeolithic Europe the wild horse was habitually hunted for food before its domestication for riding and traction. The hippophagy of ancient Scythian nomads still survives in central Asia. The practice is also recorded of early Norsemen, and in recent times horseflesh appeared in the



Hippogriff,
fabulous animal

dietary of Danish prisons. In the 8th century Pope Gregory III declared it to be unclean and execrable for human food. During the Terror, in 1793, horseflesh was eaten in Paris, and in Napoleon's retreat from Moscow, in 1812, was made into invalid soup. Some French regiments in the Crimean campaign of 1855 preserved their health by its use.

In 1845 the sale of horseflesh was authorised in Munich, and by 1855 was allowed in all German states. In 1847 Isidore Geoffroy Saint-Hilaire gave hippophagous banquets in Paris to popularise horseflesh, and in 1866 its sale was regularised in that city. During the siege of Paris in 1870-71, and throughout the First Great War, horseflesh was of great dietetic importance. During and after the Second Great War many people in the U.K. who would not normally eat it used it to supplement the meat ration. It is regularly sold in Belgium, and is a primary ingredient in some forms of French and Italian sausage.

In 1868 horseflesh was served to 150 guests at the Langham Hotel, London. The Sale of Horseflesh, etc., Regulation Act, 1889, provides a penalty of £20 for supplying it for human food without disclosure, and also for selling, offering, or exposing it except in a place bearing a conspicuous indication that horseflesh is sold there.

Hippopotamus (Gr. *hippopotamos*, river-horse). Large herbivorous mammal of the family

above the surface of the water while nearly all the rest of the head is immersed. Both nostrils and ears can be closed when under water. The thick skin is naked with the exception of bristles on the muzzle, head, and neck, and at the end of the short tail.

The common hippopotamus (*H. amphibius*) is the largest of land mammals except the elephant. It attains a length of 14 ft., and the height at the shoulder is about 4 ft. A fine male will weigh from four to five tons. The skin is blackish brown or slate colour, but white and mottled examples have been seen. Its range is now confined to Central Africa, though it formerly occurred from Lower Egypt to Cape Colony. The Biblical Behemoth is generally identified with it. In the Pleistocene period it occurred in England, being found as far N. as Yorkshire, and it is curious that its remains have been found with those of the reindeer, which is now an Arctic animal.

In habits the hippopotamus is the most aquatic of all the larger land mammals. It sleeps beneath the surface of the water, rising to breathe every four or five minutes, but can remain entirely submerged for ten minutes if pressed by hunters. Slow and clumsy on land, it is a fairly rapid swimmer. It leaves the rivers at night to graze, and in cultivated districts does a vast amount of damage to the crops. It is timid and inoffensive unless cornered, when it becomes a dangerous opponent. It has been known to live in captivity about 30 years, and in a natural state may live much longer.

Economically the hippopotamus is of some value. Its hide is used for making whips and occasionally for walking sticks and umbrella handles, and also for facing [polishing] wheels. The tusks furnish ivory, and were formerly the substance of which artificial teeth

were made. The flesh is excellent eating, and a fine animal will furnish about 200 lb. of useful fat.

The smaller species (*H. liberiensis*) is known as the pigmy hippopotamus, and is found in Liberia, the Guinea Coast, and Sierra Leone. It is black, about 6 ft. long, and weighs about 400 lb. Its head is smaller in proportion than in the common hippopotamus, and there are only two incisors in the lower jaw. Little is

known of its habits, but it appears to feed by day, is never found in companies like the larger species, and is much less aquatic.

Hippuric Acid ($C_9H_9NO_3$). Crystalline substance, contained in the urine of horses and cows. The chemical name is benzamino-acetic acid. On heating with strong acids or alkalis it decomposes into benzoic acid and glycolic acid. The crystals are colourless, and easily soluble in hot water.

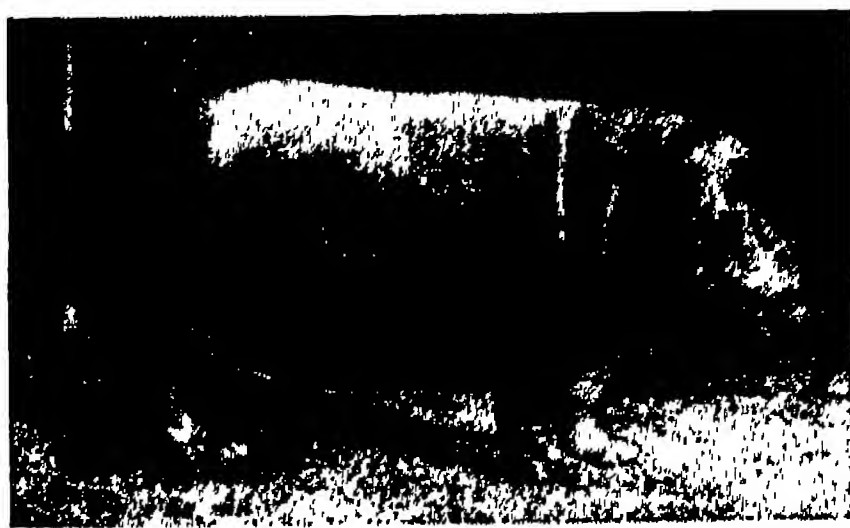
Hippurites (Gr. *hippos*, horse; *oura*, tail). Group of extinct molluscs found in Cretaceous strata in the Mediterranean area. They are remarkable for one large, usually conical or cup-shaped, shell and a smaller one which served as a cover. Fossil shells often reach three feet in length. They are found in W. and E. Alps, Dalmatia, Greece, and W. Asia.

Hirado or **FRANDO**. Island of Japan, off the N.W. coast of Kyushu. It is 55 m. N.N.W. of Nagasaki and is 19 m. in length and hilly in character. Its chief town, Hirado, a celebrated whaling station, lies on its E. shore. The island has long been celebrated for its blue and white porcelain. It was first visited by the Portuguese in the 16th century, followed by Dutch and English navigators early in the 17th. The Dutch established the first trading station in Japan for the use of foreigners at Hirado in 1610; in 1710 this was transferred to Dejima, a small island near Nagasaki.

Hiram. King of Tyre. Reigning during the time of David and Solomon, he supplied those kings with cedarwood and artificers (2 Sam. 5; 1 Chron. 14). Hiram Abif is traditionally the name of the chief artificer sent to aid Solomon in building the temple.

Hiranyagarbha. Deity of the ancient Hindu pantheon. In the oldest of the Hindu sacred writings, the Rig-Veda, he is represented as the upholder of heaven and earth, and the giver of life and breath. See Hinduism; Rig-Veda.

Hire Purchase. British legal and commercial term. Under a hire purchase agreement the owner of goods lets them on hire at a rent for a period, granting the hirer an option, exercisable at the end of the period, to buy the goods on condition that throughout the period he has paid the rent and observed the other terms of hiring. The agreement is frequently made between the hirer and a finance company which buys the goods from a trader or dealer and then lets them to the hirer. Although



Hippopotamus. Specimen of the great river hog, an animal indigenous now in Central Africa only
Gambler Bolton, F.Z.S.

Hippopotamidae, related to the *Suidae*, which comprises pigs and peccaries. There are two species, both confined to the tropical region of Africa. The body is bulky and piglike in form, with an exceptionally large head and gaping mouth armed with large tusks and incisor teeth. The lower pair of incisors projects almost straight forward. The nostrils are on the top of the muzzle, and the animal can raise them and its eyes

the sums paid as rent are legally payments only for the hire of the goods for a period, the agreement is usually so framed that they amount in total to the hire purchase price of the goods; the final sum paid to exercise the option to buy is usually only nominal in amount.

Special rules under the Hire-Purchase Acts, 1938 and 1954, apply to agreements for livestock not over £1,000, and for other goods not over £300.

Any provision authorising the owner of the goods to enter premises to seize them is illegal. Normally the goods must be fit for the purpose for which they are required, if that is made known, and, unless second-hand (and so stated), must be of reasonably good quality. When one-third of the price has been paid, the owner can recover the goods on default only by court proceedings. The above applies in England. Provisions for Scotland are in the Hire Purchase and Small Debt (Scotland) Act, 1932, and Hire-Purchase Act, 1954. The Advertisements (Hire-Purchase) Act, 1957, requires certain information to be given in advertisements.

Hirohito (b. 1901). Emperor of Japan. Born April 29, 1901, at Tokyo, son of the emperor Yoshi-



Hirohito,
Emperor of Japan

hito, he entered the peers' school in 1909 and two years later was commissioned sub-lieutenant in the army and navy. In 1921 he visited Europe, the first Japanese

crown prince to do so. On his return he became regent for his father. In 1924 he married Princess Nagako Kuni (b. March 6, 1903) and on Dec. 25, 1926, ascended the imperial throne. His reign was called Showa, or light and peace, and he furthered the westernising of his country, where manhood suffrage had been granted in 1925.

Although Hirohito's share in Japanese aggression was denied on the plea that he was above politics, he did approve the various acts of aggression from the seizure of Manchuria to the attack on Pearl Harbour. Early in the Second Great War he remained in semi-seclusion, but towards its close he issued an imperial rescript admitting that the situation was truly grave. Following the Japanese surrender, the emperor was permitted to retain his throne. On



Hiroshima, Japan. The main street of this once important city, seen ten years after its destruction by an atomic bomb, Aug. 6, 1945; a picture of the town as it appeared immediately afterwards is in page 205

Sept. 27, 1945, he broke with imperial precedent by personally visiting Gen. MacArthur, Allied c.-in-c. At a press interview he denounced war as an instrument of policy and blamed a former premier for Japanese aggression. He declared that in future the country would be governed constitutionally, and after MacArthur had decreed the abolition of Shintoism (*q.v.*) as a state religion, Hirohito on Dec. 31, 1945, declared false the conception that the Japanese emperor is divine and his people destined by their superiority to rule the world. *See* Japan.

Hirosaki. City of Honshu, Japan, in the province of Mutsu. It stands on the Tsugaru plain near a range of hills, 20 m. by rly. S.S.W. of Aomori. It has castle ruins and a museum. On the W. of the town is the solitary cone of Iwakisan, 4,650 ft., which forms a prominent landmark. Hirosaki is noted for its apples and silk, and the inhabitants are expert in the manufacture of fine lacquer ware. An important and picturesque town, it is the headquarters of a high court. Pop. 51,500.

Hiroshige, ANDO TOKITARO (1797-1858). Japanese painter. He studied under Riansai Okajima and Toyoturo Ontagawa, and established a school of art. He died at Yeddo, Oct. 12, 1858. His somewhat rare paintings and many colour prints from wood blocks of Japanese landscape are of high artistic value. The Melbourne Gallery, Australia, possesses a snow scene by him.

Hiroshima. City of Honshu, Japan, in the prefecture of Hiroshima. The former city lay pictur-

esquely at the head of a bay, on the S. coast of the island, 190 m. W. by S. of Kobe, on the rly. between that city and Shimonoski. Facing the site is the sacred islet of Itsukushima, famous for its beautiful Shinto temple, a resort of thousands of pilgrims to whom the island is known as the Island of Light.

In the city itself there were many temples and shrines, a recreation ground, and numerous ten-houses. Commercially important, Hiroshima carried on a brisk trade in lacquered ware, bronze goods, and objects of art; it was the largest depot for the surrounding district on the Inland Sea. Ujina, 4 m. away, was a busy port for steamers in the Inland Sea and Formosa trade, and after 1894 a transport base in time of war. Hills rise 700-800 ft. to the immediate N.W. and N.E. of Hiroshima, but the city itself stretched over the flat ground of shores and islands of the delta in all directions for roughly 2 m. from the centre. The latter contained reinforced concrete office and commercial buildings. Farther out lay a densely populated industrial zone of wooden workshops and dwellings, developed during the early 20th century. On the S. and W. outskirts were engineering plants.

At 8 a.m. on Aug. 6, 1945, the first atomic bomb to be used in warfare was released over Hiroshima by a Superfortress of the U.S.A.A.F. flying at 30,000 ft. The bomb exploded 1,000 ft. above the city centre, and the flash of the explosion was observed by a reconnaissance aircraft 170 m. away. Hiroshima had been practi-

cally undamaged by air attack before this, but widespread devastation was caused by the single bomb. Blast spread destruction with great uniformity in all directions. Innumerable fires burned for days, completely gutting the old town and the industrial zone enclosing it. Modern industrial buildings some 1½ m. from the centre of the explosion survived.

The scale of the disaster brought civil and industrial life to a standstill. There was a panic flight in which officials and civil defence personnel joined; even the rescue and fire services were abandoned. Clearance of debris and disposal of the dead did not begin for nearly a month. Water and gas services were completely destroyed; all communications, both internal and external, were disrupted. Of 49 bridges within 2 m. of the city centre, eleven were destroyed and the remainder damaged. All vegetation was wiped out over 100,000 sq. yds. Of Hiroshima's pop. of 343,000, 78,150 were found dead and 58,839 injured; many of those injured died later from the effects of gamma rays released by the atomic fission of the bomb. Some 95 p.c. of the people within a quarter of a mile of the explosion were killed outright, and 50 p.c. exposed to radiation at a distance of a mile eventually died. In addition, thousands who sought refuge on Ninoshima, a small island in Hiroshima Bay, died there, their bodies being found two years later during a survey to select a site for the burial of Hiroshima's dead.

By 1947 life had begun again in temporary buildings. In 1949 plans were passed for developing Hiroshima as a "peace memorial" city. See Atomic Bomb; consult Hiroshima, J. Hersey, 1946.

Hirsch, MAURICE, BARON DE (1831-96). Jewish financier and philanthropist. He was born at Munich, Dec. 9, 1831, his father and grandfather having been bankers to the Bavarian court. Having made an enormous fortune by obtaining concessions from the Ottoman government for the construction of the Balkan railways, he became an Austrian subject, and bought a magnificent estate at Ogyalla in Hungary. He took an active interest in the turf, his filly La Flèche winning the Oaks, the St. Leger, and the 1,000 Guineas in 1892. He contributed more than £2,000,000 to a society for settling Russian Jews in Argentina and Canada, and did much in other ways to help distressed members of his race. He died April 21, 1896.

Hirschberg (Pol. Jelenia Gora). Town of Silesia. Historical centre of Germany's textile industry, especially veil making, and later linen, it is in the area placed under Polish administration 1945. On the Bober, Hirschberg is a rly. junction between Breslau and Görlitz, 30 m. S.W. of Liegnitz. It has three old churches, a town hall (1747), several towers, gabled houses in Baroque style, and famous arcades. It is a centre for touring the Riesen Gebirge. Besides textiles, paper, iron, and glass industries flourished before 1939. Pop. 31,407. Another Hirschberg, on the Saale in Thuringia, 14 m. W.S.W. of Plauen, is known for a 17th century castle and its National park reserve.

Hirschfeld, GEORG (b. 1873). German novelist. Born in Berlin, Nov. 11, 1873, he came under the influence of Gerhart Hauptmann, and at 20 began to write. In 1895 he produced *Dämon Kleist*, followed by several plays, of which *Die Mütter* and *Agnes Jordan* had successful runs. His best known works were *Freundschaft*, 1902; *Das grüne Band*, 1905; *Das Mädchen von Lille*, 1907; *Onkel und Tante Vantee*, 1913; and a biography of Byron, 1926.

Hirschsprung's Disease. A complaint called after the surgeon who first described it. This is a congenital dilatation of the colon due to non-functioning of the neuro-muscular mechanism of the bowel. Treatment consists of stimulation of the gut wall by strychnine, massage, and electricity, and dieting.

Hirst, HUGO HIRST, 1ST BARON (1863-1943). British industrialist. Of Jewish origin, Hirst was born in Munich, Nov. 26, 1863, the son of Emmanuel Hirsch; he emigrated to England in 1881, changing his name two years later. In 1889 he founded the firm which later became the General Electric co., and with its growth became wealthy and influential. He was a member of the board of trade advisory council, 1923-25, and committee on unemployment insurance, 1925-26, and at various times was president of the F.B.I., the Institute of Fuel, and the British Electrical Development Society. He became a baronet in 1925 and a baron in 1934. In 1942 he gave £20,000 to the benevolent fund of the Inst. of Electrical Engineers, to be known as the Hirst Fund. He died Jan. 22, 1943.

Hirst, GEORGE HERBERT (1871-1954). British professional cricketer. Born Sept. 7, 1871, at

Kirkheaton, Yorks, he played regularly for Yorkshire 1892-1922, and for England against Australia 1897-1909. He was a fine batsman and a fast-medium left-hand bowler, with a most deceptive swerve. His best batting year was 1904, when he scored 2,501 runs with an average of 54.36, and his best bowling year was 1906, when he took 208 wickets for an average of 16.5. In 1906 also, with 2,385 runs, he set up a unique record—2,000 runs and 200 wickets; he scored 1,000 runs and took 100 wickets in 14 seasons. He appeared in a county match in 1929, forty years after his first. He was cricket coach at Eton 1920-30. He died May 10, 1954.

Hirtius, AULUS (d. 43 B.C.). One of the lieutenants of Julius Caesar in Gaul. The authorship of an eighth book on the Gallic War and of a history of Caesar's Alexandrian war is generally attributed to him. In 43 he and Pansa, his colleague in the consulship, were sent to relieve Mutina (Modena), then besieged by Antony. Antony was defeated; but both consuls lost their lives.

Hispaniola. Latin name for the island of Haiti (*q.v.*).

Hispano Gun. Light A.A. gun first produced by the Hispano-Suiza motor company and later adopted by the British and other governments. A recoil-gas-operated gun, very light and mobile, it fired 16 types of 20-mm. ammunition. The gun was fed by a drum magazine containing 30 rounds or a belt holding 100 rounds. Rate of fire was 600 rounds per min., effective range 6,000 ft. In the Second Great War most British fighter aircraft carried Hispanos.

Hispar. Pass and glacier in the Karakoram Mts., Central Asia, N. of Baltistan, Little Tibet. It reaches an alt. of 17,650 ft.

Hissar. District and town of Punjab, India. About four-fifths of the dist. is under cultivation, the chief crops being millet, barley, and wheat. The rainfall is about 15 ins.; it is supplemented by irrigation from the Sirhind and Western Jumna canals. There are cotton ginning and pressing factories. Area 5,213 sq. m. Pop. (1951) 1,045,645.

At Hissar town, a rly. junction, are two colleges of Punjab University. Pop. (1951) 35,297.

Hissar OR GISSAR. Town of Padjhik S.S.R. It lies 20 m. S.W. of Stalinabad. Once the capital of an independent region, it was famous for knives, damascene swords, and silk. The valley of the

river Kafirnigan in which it lies is artificially irrigated and very fertile, producing cotton, flax, and rice; but the climate is hot and unhealthy. In the Hissar Hills near by there are coal deposits.

Hiss Case. Perjury trial in the U.S.A. Whittaker Chambers, ex-Communist, in evidence before the U.S. house of representatives committee on un-American activities in 1948, claimed that he had known as a member of a Communist "underground" group in Washington Alger Hiss (b. 1904), an official of the state dept. who had been an adviser of F. D. Roosevelt at Yalta, sec.-gen. of the U.S. delegation to the San Francisco conference, and was director of the Carnegie endowment for international peace 1946-49. Hiss denied the allegation, and, when Chambers repeated it in a broadcast, at the urgent persuasion of his friends started an action for slander, claiming 75,000 dollars damages.

Meanwhile, Chambers produced to the committee on un-American activities microfilms of typed govt. documents, which he said had been given to him by Hiss during 1934-38. Before a federal grand jury investigating alleged Communist spying, Chambers named the Russian agent to whom he said he gave films of documents provided by Hiss and others. Hiss and his wife were called to give evidence before the grand jury, which ordered Hiss's arrest for perjury, Dec. 15, 1948.

This perjury case was heard by the N.Y. federal district court, May 31-July 8, 1949; the jury disagreed and a new trial was ordered. This second trial lasted from Nov. 17, 1949, to Jan. 21, 1950, when Hiss was found guilty and condemned to 5 years' imprisonment. The conviction was several times confirmed on appeal, and Hiss served his full sentence, 1951-56. In 1957 he published in the Court of Public Opinion, in which he claimed he was a victim of "forgery by typewriter." *Consult also* A Generation on Trial, Alastair Cooke, 1950; Seeds of Treason, R. de Toledano and B. Laakey, 1950; Witness, W. Chambers, 1952.

Histamine. Bodily substance chemically described as β -iminozyl-ethylamine, a base derived from the amino-acid histidine by the loss of carbon dioxide. Produced in cells at a seat of injury, it is believed to be an agent of shock conditions, causing contraction of plain muscle and dilatation of the capillaries. It is the

immediate cause of allergic maladies, migraine, hay fever, nettle-rash, etc., and is sometimes given by injection in treatment of vasomotor disturbance.

Histology. (Gr. *histos*, web, tissue). Branch of biology dealing with the microscopical structure of the tissues of organisms, especially of animals. The tissues of both plants and animals consist of cells, and structures derived from them; histology concerns itself primarily with these tissue elements and the ways in which they occur together.

The study of cells generally began with the discovery of blood corpuscles by Malpighi (1628-94); that of plant cells was initiated by Robert Hooke (1667). François Bichat (*q.v.*), the French physiologist, laid the foundations of animal histology in his great work, *Anatomie Générale Appliquée à la Physiologie et à la Médecine* (1801-12), in which he showed the intimate connexion between the heart, brain, and lungs, and classified tissues according to their structure. Hugo von Mohl, Schleiden, and Schwann made further progress in the science of histology by their studies of the cellular structure of plants, the last two showing that animal and plant tissues all develop from cells.

The cells of embryos of plants and animals, together with most other cells which multiply rapidly, have much in common. They consist of relatively dense, uninnucleate protoplasts tending to be spherical but rendered polyhedral by mutual pressure. Marked differences become apparent, however, both between the tissue elements of plants and animals, and among the various kinds of tissue elements of any one organism, as the growing tissues mature. One outstanding difference between plant and animal tissue elements generally is the preponderance of sap over protoplast in the former and the reverse in the latter; another is the tendency in plants for the formation of massive cell walls, not usually found in animal tissues where, except in such instances as bone, the adjacent protoplasts lie close together. On this account the limits of the elements in plant tissues are readily visible, while those in animals are less strongly defined. Hence plant histology stresses the construction and constitution of the wall of the individual element, while animal histology deals chiefly with the forms of the protoplasts and their aggregation into tissues.

Among the commonest tissue elements found in plants are parenchyma cells, approximately isodiametric with a large vacuole enveloped in a thin layer of cytoplasm within the wall, which may be chiefly cellulose or may contain in addition a quantity of lignin to make it lignified (woody); collenchyma cells, more or less cylindrical with unequally thickened walls, usually of cellulose, containing protoplasts; sclerenchyma fibres, elongated elements with tapering ends, having considerably thickened walls which are usually lignified but within which the protoplasts have degenerated; sieve tubes, tubular elements with cellulose walls lined with cytoplasm which are derived from rows of cells whose cavities have become confluent by the formation of pores in the walls between them, each perforated wall being a sieve plate; xylem vessels, tubular elements with lignification in their walls but without protoplasts when mature, derived from a row of cells by the extensive dissolution of the intervening walls.

The last two kinds of element normally occur with others in the phloem and xylem tissues respectively, so forming complex tissues in contrast to simple tissues which are constituted of parenchyma cells, collenchyma cells, or sclerenchyma fibres alone.

Varieties of Animal Tissue

Of the simpler animal tissues, epithelia consist of one or a few layers of close fitting cells resting on a basement membrane to form the external surfaces of animals or the linings to cavities of the body, which communicate with the exterior; according to the shape of the individual cell, when the tissue is single layered, it is called pavement, cubical, columnar, or ciliated epithelium; if cells are superposed in layers the epithelium is stratified. In connective tissue the cells are embedded in copious ground substance so as to appear widely separated by it; this matrix is a uniform glistening material in hyaline cartilage, but contains fine elastic fibres in elastic cartilage; it is infiltrated with calcium salts in bone. Blood consists of a fluid—the plasma—in which are suspended red blood-cells (erythrocytes), white blood-cells (leucocytes), and platelets. Voluntary muscles (those under the control of the will) are principally formed of striated muscle fibres, so called because they exhibit alternate dark and light bands across their length; involuntary muscle fibres

do not show this striation. Nerve tissues are made up of cells from which filamentous outgrowths project; the main body of the cell is the cyton, long outgrowths are axons, short ones dendrons.

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Historical Manuscripts Commission. In the U.K., a royal commission appointed in 1869 to examine and report upon the historical records (other than the public records), manuscripts, etc., in existence in the country. It is a permanent body, the chairman being the master of the rolls, and has published detailed reports on various valuable collections of historical material, e.g. those at Hatfield and Longleat. Since 1945 it has been compiling a register of archives. See Public Record Office; State Papers.

Historical Method. Term used mainly in economics for a method of inquiry that bases its results upon the facts of historical research rather than upon theories.

It is the inductive as opposed to the deductive method. More narrowly it is applied to those German scholars who follow the system founded by Roscher (*q.v.*).

Historical Society, ROYAL. British learned society founded in 1868. Its objects are the promotion of historical study and research. It absorbed the Camden Society (see W. Camden) in 1897, and continued the Camden Reprints. Papers are read at its monthly meetings, and its transactions are published annually. The offices are at 96, Cheyne Walk, London, S.W.10.

Historiographer (Gr. *historia*, history; *graphein*, to write). Official historian. Soon after the revival of learning certain rulers and princes began to appoint scholars to write the histories of themselves and their lands. The emperor Charles V, Louis XIV, and other kings of France, for instance, had their historiographers royal, who included Racine and Voltaire, while Charles II of England appointed one on his Restoration. Obviously the work of these men, who had to write something laudatory, had little value. The most interesting of these survivals is the king's historiographer in Scotland. The office existed there before 1603, but fell into abeyance. In 1763 it was revived, William Robertson being appointed. His successors included the historians J. H. Burton and W. F. Skene.

imagination of the student. It is improbable that any historians, however learned, will ever succeed in displacing the conceptions of historical figures created by the plays of Shakespeare, or the novels of Walter Scott and others, in spite of the knowledge that such works made no profession of historical accuracy; and while nine educated persons out of ten are aware that Macaulay, Carlyle, and Froude are denounced as misleading, the majority will prove in effect to be their more or less unconscious disciples.

The study of history provides us with actual precedents, and the data for principles to be applied to present-day problems, though it is necessary to bear in mind the paradox that, although "history repeats itself" perpetually, it may be said with equal truth that it never repeats itself. The events of the past manifestly have a bearing upon the present, but there is always a danger of forgetting that the nature of a problem may be entirely changed by quite unobtrusive variations in circumstances.

To the youthful mind the practical problems of citizenship, most of the political side of history, are not easily made intelligible and interesting, but youth is susceptible to the inspiration of high enthusiasms, noble ideals, chivalrous sympathies, heroic deeds. For the formation of character, nothing is more essential than to foster such susceptibilities, to train the mind of the child to admire rightly noble men, noble women, and noble deeds, to hate foul deeds and their doers. And therewith it is essential to instil the sense of justice. To this end history rightly handled is an incomparable medium. Every boy or girl is the better for learning to conceive an enthusiastic admiration for Leonidas, Regulus, Robert Bruce, Joan of Arc, or Sir Philip Sidney; the better for learning to be just to Cromwell or Edward I. When the study of history becomes a search for unprejudiced historic truth, there is no finer moral training.

History in the literary sense came actually into being when men began to concern themselves not merely with recording contemporary events, but also with comparing and coordinating, however uncritically, such records as had survived from the past, whether graven, or written, or through oral tradition. The earliest historical literature we possess is that of the Hebrew Scriptures, and it is at least tolerably certain that, in the

HISTORY: THE STUDY OF THE PAST

A. D. Innes, M.A., Author of *A History of the British Nation*

This article describes the main principles which underlie the study of history, on which subject there are hundreds of articles in this Encyclopedia. These articles include histories of all the nations of the world, both past and present, sketches of Feudalism, the Reformation, and other intellectual and economic movements, and biographies of kings, soldiers, and statesmen; also historians

History is concerned with the inception, progress, or decay of organized communities, the movements, the events, and the personalities connected therewith. In the literary sense of the term, it is the written or pictured record of that process of development. In the scientific sense it is the accumulation and investigation of the data provided by the past for the science of politics, with which every citizen is vitally concerned in a country where every citizen has a share, however small, in controlling the government of the state, a periodical duty of pronouncing his own judgement upon political questions, and a definite responsibility towards the state of which he is a member. History is the gathered experience of the past in relation to

social and political organization, and so for all responsible citizens it is a study of serious practical importance.

The functions of the historian are threefold: to ascertain and accumulate facts; to coordinate and relate them in true perspective; and to indicate and test the generalisations which may be inferred; to which may be added the fourth function, that of artistic presentation. For the ordinary citizen cannot himself be a historian; it is from the historians' researches that he must derive his knowledge of history; and it is absolutely certain that the historians from whom he will derive it will be those who present it in a manner which appeals effectively to the

form in which we have them, they are derived in part from documents which must have been in existence some fifteen hundred years before the Christian era. In this sense they are the earliest consecutive narrative consciously constructed as a story of the development of an organized community. The things elsewhere written or depicted at an earlier date were either symbolical or were presentations of contemporary episodes, or were not made with the intention of recording events, though of great value to students endeavouring to reconstruct the past. Such were the legal code of Hammurabi, king of Babylon, the Amraphel of whom we read in the book of Genesis as the contemporary of Abraham, diplomatic correspondence like the Tell el-Amarna Letters, discovered in Egypt in 1888, and various other documents and monuments.

In the 7th and 6th centuries, Babylonia and Assyria began to produce official annals. In Egypt, too, the priestly caste had preserved historical records from which a scanty information was presently to be derived by lay inquirers. In the remote East, the Chinese, a very advanced people, compiled their own records, as also did the Aryan invaders of India. But it was in the 5th century B.C., when Greek literature burst into full blossom, that history permanently established itself as a branch of literary art and of political science. Apart from the Hebrew chronicles, the world before the 5th century provided materials for historical investigation, but it did not provide historians.

The historian first reveals himself in literature as the child of the epic poet. He is a man with a great story to tell, a drama vivid with human life, only his medium is not verse but prose; and, whereas to the poet it is a matter of indifference whether things actually happened as he relates them, whether his story is fact or fiction, or blend of fact with fiction, the historian intends his story to be one of actual fact duly verified. As with the epic poet, his work must be on the heroic side, but his characters are real, not imaginary kings, captains and statesmen, leaders of men.

The Father of History

So it was with the Hebrew chroniclers; so it was with the Greek Herodotus, who is called "the Father of history," who told the immortal story of the mighty contest wherein Greece in the days of her glory did battle for the cause of freedom and rolled back the flood of Orientalism. Incidentally

he collected and set forth much information, not without a legendary element, concerning the rise of the Persian empire and the antiquities of Egypt. A generation later the scientific element was introduced by Thucydides, who chose for his theme contemporary history—the struggle for supremacy between the two leading states of the Hellenic world, wherein he himself played a minor part. It might be said that Herodotus and Thucydides, two of the greatest among all literary artists, set between them the models which have been followed by all the great literary historians, from Livy and Tacitus through Froissart to Hume and Gibbon, Macaulay, Carlyle, and Mommsen. The extraordinary merits of Thucydides have given to his subject, the contest between Athens and Sparta, a historical prominence out of proportion to its intrinsic importance, by reason of the masterly treatment it received, which enhances its interest to the student of political science.

From the time of Thucydides onwards there was among the Greeks no lack of historians, though none can be named as of the first rank; their work is for the most part valuable only so far as it relates to contemporary events. They provide the modern inquirer with little more than outlines to be filled in from other sources, such as the recorded speeches of political orators or the discussions of political theory by philosophers.

The Roman Era

Historical writing again comes to the forefront in the great literary era of Rome, which begins in the days of Julius Caesar and ends some century and a half after his death. Caesar himself appears as a historian in the record of his campaigns in Gaul. Livy, in a brilliant narrative, relates all that either traditions or authoritative records have to tell of Rome's past. Tacitus gives a masterly though extremely biased picture of political conditions, persons, and events at the moment when Republican Rome had transformed itself into Imperial Rome. And still the modern investigator finds even more guidance in the works of men of letters who were not professed historians, in the satires of the poets, and in the semi-philosophical discourses, the public orations, and the private epistles of Cicero, while the art of historical portraiture was perfected by the pen of Plutarch.

The age of the Antonines, great in many ways, was unproductive. An intellectual stupor took possession of the Roman Empire; in the west

it was overwhelmed by the barbarian flood, against which in the east it maintained only a precarious existence. The records of the early Middle Ages were compiled mainly in the extremely uncritical and secluded atmosphere of the cloister. Though literature was smothered in the outer turmoil, in the cloister records were preserved, such as the Anglo-Saxon Chronicle. Apart from the official chroniclers of contemporary events, although so-called histories were written, little serious attempt was made to distinguish between fact and fiction; picturesque legend absolutely incredible was allowed to pass for history at least as concerned the past. But in the 13th century a new literary era was dawning; in the 14th it had dawned. The art of writing contemporary history revived with Froissart, though to him it was still only the painting of its gorgeous pageantry.

Froissart and Raleigh

With the sixteenth century, the revival of letters, already active in Italy for two centuries, but only sporadic elsewhere, expanded all over western Europe at the moment when letters had been finally extirpated in the east. Thenceforth the recording of contemporary history became general; later medieval history was treated in the spirit of Froissart, and what may be called the authorised histories of Greece and Rome were studied as a necessary part of polite culture, the outcome of the discovery of the classical literature of Rome and Greece. At the same time history again began to be treated as a branch of political science, the Florentine Machiavelli leading the way.

From the beginning of the sixteenth century, then, there is an abundance of literary records ready to the hand of the modern inquirer. Through the Tudor period vigorous and picturesque narrative is characteristic of the English and Scottish writers, whether they are dealing trenchantly with the story of the Reformation, like John Knox, or Foxe in the Book of Martyrs, or telling the sagas of the Elizabethan seamen, as in Hakluyt's Voyages and the soul-stirring narratives of Sir Walter Raleigh. Raleigh travelled into a still more remote past; for when he lay a prisoner in the Tower he set about writing a History of the World, which Oliver Cromwell ranked next to his Bible. We do not now read Raleigh's History of the World, any more than we use Elizabethan maps for the study of geography. Its value as conveying a knowledge of

the past is nil. But in this particular book the value lies not so much in the narrative as in the commentary of one of the most brilliant intellects of the most brilliant epoch of English literature. Of another type altogether in the historical field were the researches of John Stowe, who unearthed the works of those medieval chroniclers who provide us with the real groundwork of our knowledge of the Plantagenet era—Matthew Paris, Thomas of Walsingham, the so-called Matthew of Westminster, and others.

Invaluable Private Memoirs

The 17th century begins to provide us with what grew into an increasing stream of literary works which are not in form histories but memoirs invaluable to the historian, of which an admirable example is Lucy Hutchinson's *Life of her husband, the Puritan colonel*, together with the immortal diaries of Samuel Pepys and John Evelyn, none of them works written for publication. But it gives us also two great works of contemporary historians. The *History of the Great Rebellion*, by Lord Clarendon, and *The History of My Own Time*, by Gilbert Burnet, who was also the author of a *History of the Reformation in England*. Clarendon's work at least remains a literary classic. Everywhere, however, the historians continued to devote themselves entirely to the modern era until the 18th century was far advanced, whilst in France Saint-Simon was writing the incomparable *Memoirs*, which were not published till the 19th century, and Voltaire was producing his brilliant pictures of Charles XII and Peter the Great, and of the Ages of Louis XIV and Louis XV, more with an eye to literary effect than to the pursuit of exact historic truth.

But with the second half of the 18th century a reaction was setting in against the convention in France which may be said to have recognized only two eras as of real importance in the history of the world—the Augustan Age of Rome and the Bourbon Age of Europe. From Scotland, Hume produced the first great *History of England*, and Robertson the first great *History of Scotland*; and in his *Charles V* Robertson gave something like an appreciation of the Middle Ages.

Already in France Montesquieu, not writing history in the technical sense, had developed the principle of examining political institutions in the light of the history of their growth and development, and their

relation to institutions in other countries and other ages; and Burke, as a statesman, was insisting upon a corresponding theme. Then came again from Britain two monumental works, both in 1776: Adam Smith's *The Wealth of Nations*, which developed the relation between the scientific studies of history and of economics, and the work which is perhaps the greatest of all histories, Gibbon's *Decline and Fall of the Roman Empire*.

This, at least, is to be said of Gibbon, that, like Thucydides, he can never be superseded; all other work covering the ground will be in the nature of a commentary on Gibbon, however much those particular commentaries may compel us to revise particular judgements of the great man, or newly coordinated data may correct misapprehensions of fact which it was impossible for him to avoid. And his achievement was the more tremendous because, unlike Thucydides, he wrote not of what he had seen and heard with his own eyes and ears in one small corner of the world during a single lifetime, but of the long-past history of half the civilized world during a thousand years. Gibbon, in fact, gave a new meaning to the name of historian; and his work was hardly finished when the cataclysm of the French Revolution and the wars which followed upon it gave a new import to history.

Renewed Study of Ancient History

The 19th century witnessed first the further revival of that interest in the past the beginnings of which we have noted as preceding the revolution, the interest especially in medievalism which is associated with the whole movement known as romanticism. Next, the labours of Niebuhr gave a new vitality to the story of Ancient Rome—one which is of the most profound interest to the British race, the creators of an empire to which none save that of Rome offers an approximate analogy. On the renewed study of Roman history as a subject of vivid living interest followed a like revival of the study of the states of ancient Greece; and from the study of Greece the new spirit of inquiry extended itself to the yet more ancient empires of the East, the excavation and interpretation of ancient monuments which at last began to reveal the secrets that had been hidden for more than 3,000 years. Nor did the movement end here, but carried itself into investigations of primitive

social conditions—so primitive that when they existed no conscious records of them were made. History, in short, in one of its aspects—archaeology—became a reconstruction of the only half-realized structures of the remote past, and also a detailed examination of origins. It was no longer a picturing of the full-grown plant in full leaf, but an inquiry into its organic life.

The literature of the 19th century is crowded with the names of brilliant exponents, from those who have taken all historical knowledge to be their province, such as Buckle, whose work on *The History of Civilization* was merely conceived as an introduction to the subject, to men whose real work was concentrated upon a particular period, such as Macaulay or Froude.

Macaulay's Method of Presentation

Macaulay made it definitely his business to write history in such a manner that its interest might appeal with no less attraction than pure, unqualified fiction to ordinary men and women. He did so by making it a picture of a live world full of live people, generally either very good or very wicked. Incidentally, he was among the first to make his presentation of history a medium for teaching his own political doctrines, not without much collecting and sifting of evidence, but with a firm conviction that such evidence as told against his preconceptions came from tainted sources, while anything that told in favour of them required no further guarantee for its veracity. Much the same might be said of Froude. Of a different school were Hallam and James Mill, who rejected the attitude of palpable advocacy which Froude and Macaulay made no attempt to conceal, and assumed an air of rigid philosophic impartiality which veiled an equally firm determination to impose their own predilections upon their readers. An artist of a different type was J. R. Green, who was concerned with the atmosphere rather than the drama of history, with the landscape, the setting, more than with the portraits.

On the other hand, the theory of history which treats it as pivoting upon great personalities, the old principle of portraiture, found the mightiest of all its exponents in Thomas Carlyle. The doctrine which he practised with tremendous effect, not only in his *History of Frederick the Great* and *The Letters and Speeches of Oliver Cromwell*, but also in *The French*

Revolution, is most explicitly set forth in Heroes and Hero-Worship. In effect, its essential premise is that what is of significance in the history of the world is the history of its great men, its heroes.

Carlyle's hero theory found many followers; but before the 19th century was out revolt against it came from various schools of writers. One school, for instance, saw history as a struggle between nations for economic advantage; another, inspired by Marx, saw it as a prolonged class struggle; a third sought, by careful study of all existing evidence, to reconstruct an unbiased picture of the lives of the common people in terms of the period described. In this last group an outstanding figure was G. M. Trevelyan.

New schools will doubtless continue to arise. None of them can present the whole truth, though each in turn, old and new alike, shows a facet—sometimes large, sometimes small—of the truth.

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Hit. Town of Iraq. It stands on the Euphrates, 140 m. N.W. of Hilla and 33 m. N. of Ramadie. Anciently known as Is, and identified by some authorities with Ahava (Ezra 8, v. 15), it is about 85 m. W.N.W. of Bagdad and 70 m. W. of Tekrit, with which it is connected by a desert road. It is famous for its gardens of mulberries and peaches, and is also noted for its wells of bitumen, which the Arabs call the mouths of hell. During the First Great War Hit was occupied in March, 1918, by the British in the course of the operations in Mesopotamia (Iraq) against the Turks. See Mesopotamia, Conquest of.

Hitchcock, ALFRED JOSEPH (b. 1899). British film director. Born Aug. 13, 1899, he was educated at



Alfred Hitchcock, British film director

S. Ignatius college, London. In 1920 he became junior technician at the British studio of Famous Players-Lasky, later becoming scenario writer, art

director, and production manager for Gainsborough Pictures. During the 1930s he achieved a leading



Hitchin, Hertfordshire. Market square and the parish church of S. Mary

place in British films as director, and his pictures included screen adaptations of Juno and the Paycock, and The Skin Game; The Lodger; The 39 Steps, 1935; Secret Agent, 1936; The Lady Vanishes, 1938. He went to Hollywood in 1939. Among later films, some made in Hollywood, some in England, were Rebecca, 1940; Rope, 1948; Rear Window, 1954.

Hitchin. An urban dist, and market town of Hertfordshire, England. It is 32 m. by rly. N. of London, and lies just off the Icknield Way (q.v.). The fine old parish church of S. Mary (formerly S. Andrew's) contains medieval roofs, an ancient font, mosaics, effigies, brasses, and other features of an antiquarian interest. Near by are Golden Square, where Eugene Aram lived, and the wide thoroughfare called Bancroft. On the site of the Baptist chapel in Tilehouse Street once stood a building in which Bunyan preached. Chapman was a resident. Girton College (q.v.), removed to Cambridge in

1872, was established here in 1869. There are a corn exchange and a town hall, library and museum, and the council maintains cattle and general markets and a swimming pool.

Hitchin was known to the Saxons as Hiche, probably from the

little river Hiz, which rises in the vicinity. Edward the Confessor conferred the manor upon Harold. The Priory, a seat of the Radcliffe family, is on the site of a Carmelite monastery, and almshouses include remains of a Gilbertine nunnery. Shandy Hall, residence of the original of Sterne's Uncle Toby, has disappeared.

Hitchin is a busy town, mainly residential in character, but with many light industries including parchment making, engineering, and lavender distilling. The town gives its name to a county constituency. Market days, Tuos. and Sat. (held in S. Mary's square). Fairs are usually held in May and Sept. Pop. (1951) 19,963.

Hitther Green. Residential district and suburb of S.E. London. It is in the met. bor. of Lewisham (q.v.), 7 m. S.E. of Charing Cross on the electric rly. Here is Park Hospital, a large fever hospital. Mountsfield Park, a pleasure ground of 12½ acres, was opened to the public in 1905.

ADOLF HITLER: FÜHRER OF GERMANY

Edgar Stern-Rubarth, Ph.D.

The life story of the strange fanatic who seized the opportunity given by the disintegration of German society after the First Great War to enslave the Reich and attempt the enslavement of the world.

See also Germany; Nazism; Second Great War, etc.; also Concentration Camp; Gestapo; July Plot; S.S., etc., and biographies of Hitler's associates, e.g. Goebbels; Goering; Hess;

Himmler; Ribbentrop

Adolf Hitler, the son of a minor Austrian customs official who had changed his name from Schicklgruber to Hitler, and of his third wife, Clara Poelzl, was born at Braunau, Austria, April 20, 1889. His father died in 1903, and Hitler left the secondary school at Linz after passing through only four classes, to follow art. Apprenticed to a house-painter and paperhanger, he seems to have spent much of his time at home. In 1907 he submitted drawings and paintings to the Vienna academy, with a view to studying there, but was rejected

for lack of talent. He subsequently lived for several years in Vienna, living in doss-houses by peddling postcards he had himself painted, by occasional labour as a bricklayer, and by other odd jobs. There he imbibed the pan-German and anti-Semitic ideas of the Wolf-Schoenerer nationalist party.

At 23 he left Vienna for Munich, continuing to live on casual earnings. The outbreak of the First Great War "enraptured" him and, though he had evaded conscription in Austria, he promptly volunteered for a Bavarian infantry regiment. He served all

through the war, as an orderly, on the Western Front; his record stated that he was a conscientious soldier, but not qualified to be a leader because of his servility to superiors and arrogance to comrades. The iron cross first class which he wore later he secured by subsequent forgery of documents; his rank as *Gefreiter* simply meant that as a soldier of a certain length of service, he was exempted from certain fatigue duties. After the war, he was employed, in the revolutionary days of the Bavarian republic, as spy and *agent provocateur* among the many small political groups that had sprung into being.

In the back room of a beer cellar, a handful of insignificant people under the chairmanship of a certain Anton Drexler, calling themselves the German workers' party, proved receptive of Hitler's ideas, absurd as they seemed at first sight, and of their presentation in a new type of violent oratory. He became the seventh member of the group, increased its membership among unemployed workers, impoverished middle-class people, discharged soldiers, and others, ousted Drexler (1921), and changed the name of the group to National Socialist German Workers' party. In Dec., 1920, he acquired a small local weekly, renamed it *Voelkischer Beobachter*, and used it to spread his ideas.

Ideology of the Nazi System

These, subsequently expounded in his book *Mein Kampf*, can be summarised as follows. All human civilization is the result of race and blood—of an "Aryan" or "Nordic" race, in particular the German or Teutonic. It is faced by a sinister power of destruction, that of the Jews, who, in a secret, world-wide plot, try to destroy the Aryan peoples by bringing about their racial disintegration; France and Soviet Russia were their particular instruments, and the First Great War was an attack organized by "world Jewry" on the German bastion, aided by socialism, communism, freemasonry, and democracy at home—the "stab-in-the-back" myth. A reawakened Germany—to whose leadership he, Hitler, feels called—must therefore suppress the Jews and all other groups and parties; unite all German speaking people in one Reich and—in order to avoid a repetition of William II's blunder in antagonising racially akin Great Britain by naval and colonial ex-

pansion—must seek "living space" in the E. of the Continent. The help of Great Britain and Italy must be secured to destroy France and the "vile Bolshevik regime of sub-humans," and to create Greater Germany, the "Reich of a thousand years." As yet, Hitler did not openly include the churches in his black list, although stressing the note of a specific "Aryan" mysticism derived from primitive Teutonic paganism.

Though his success was then confined in the main to Munich and



Adolf Hitler: a studio portrait. Top, characteristic snapshot of the Führer making a speech

surrounding parts of Bavaria, Hitler mistook conflicts between Munich and Berlin, during the peak period of Germany's inflation disasters, for the twilight of the Weimar republic and his chance of seizing power. He tried to involve the Bavarian state commissioner, Dr. von Kahr, and General von Lossow in a rising on Nov. 8, 1923; but they and the troops turned against him, and with Gen. Ludendorff, whom he had won over, he fled, leaving 14 of his associates dead. Captured with others, Hitler was sentenced in April, 1924, to five years' confinement in the fortress of Landsberg, but was released on Dec. 20, 1924, on his promise never again to attempt a *Putsch*.

During that term in a comfortable prison he dictated to Rudolf Hess (*q.v.*) the first volume of *Mein Kampf*; on his release, he set about reconstructing his party (see National Socialism), his propaganda already including mass annual rallies at Nuremberg. Exploiting the complete political liberty granted by the Weimar constitu-

tion to destroy it from inside, and altogether unscrupulous in his attacks as well as his promises, he attracted first the craftsmen, shopkeepers, pensioners, and other groups impoverished by inflation by promising to abolish chain and department stores; then the workers hit by mounting unemployment and wage cuts; then the hard-driven peasantry, unsuccessful landowners, and others, pillars hitherto of the conservative National party. The small but important professional army was benevolent; while Hitler's paramilitary organizations, the S.A. and S.S., created by ex-captain Ernst Roehm, increased in strength.

Naturalisation was refused him, but he secured it by taking a minor "token" civil service post in the Nazi-controlled province of Thuringia, and in 1932 stood unsuccessfully against Hindenburg in the presidential election. At a meeting arranged by Papen with Rhenish-Westphalian bankers and industrialists, he forswore such pseudo-socialism as he had preached, and was then helped to power (Jan. 30, 1933) by nationalist plotters around Hindenburg, men who expected to use Hitler and his party as their tools. They were mistaken: Hitler and his lieutenants, first Goering and Goebbels, then Himmler and Ribbentrop, eliminated one rival group after another in rapid succession. Gestapo, concentration camps, S.S., and other means of "persuasion" overcame popular opinion as to Hitler's regime; and on June 30, 1934, he eliminated, in a first mass "purge," potential opponents inside and outside his own party by having massacred from 700 to 1,100 people, including Roehm, von Kahr, and General von Schleicher.

Self-proclaimed Führer

A month later, Aug. 2, Hindenburg died, and Hitler proclaimed himself *Führer* and Reich chancellor of Germany. He sprang one surprise after another upon the world: general conscription in March, 1935; "racial" anti-Jewish laws in Sept.; re-militarisation of the Rhineland, March 7, 1936; annexation by force of Austria, March 12, 1938; a violent campaign for the separation of Sudetenland from Czecho-Slovakia leading to the Munich agreement Sept. 30, 1938, by which Hitler got what he had demanded; the annexation of Czecho-Slovakia, March 15, 1939. A campaign of insult against Poland, with which Hitler had concluded a ten-year pact of non-aggression in 1934

started immediately; and an ultimatum to Lithuania gave him Memel, March 22; a pact followed with his former arch-enemy, Soviet Russia, on Aug. 23; and on Sept. 1 came the annexation of Danzig and the invasion of Poland.

Hitler, who had never previously travelled, visited in triumph the capitals successively conquered by his armies, until, after repeated attempts to take Moscow had failed, he dismissed F.-M. von Brauchitsch, Dec., 1941, assumed command of the German forces in person, making his h.q. on the Eastern Front, and in April, 1942, received from the Reichstag the title "supreme war lord." The end of 1942 saw the German wave reach its limit, and begin to fall back. Reverses followed at a growing pace. Hitler continued to direct the armies personally, but his public utterances came at longer intervals. Then, on July 20, 1944, a plot, long nursed, came to a head in an attempt to kill Hitler with a bomb. (See July Plot.) It failed: Hitler was merely wounded. But another purge swept away thousands of his actual and potential enemies at home.

Hitler's End

The Allied advance into Germany itself continued from E. and W. until the two forces met on April 25, 1945. On the same day Berlin, where Hitler remained with a few faithful followers including Bormann and Goebbels, in the air raid shelter under the chancellery, was encircled by the Red army. He was married to Eva Braun, one of his few intimate friends, in the evening of April 29, and next day, April 30, 1945, they both died—presumably by suicide. Their bodies were burned in the chancellery courtyard.

Hitler's personal faithlessness, his complete lack of scruple in giving and breaking the most solemn pledges, his egocentric and maniac way of speaking and behaving, his conceit, and his frequent raving fits, stamp him as mentally unbalanced; yet he had gifts that fascinated. He could offer his audiences the most effective, if primitive, arguments, varied according to their composition; he staged his mass demonstrations with almost unparalleled showmanship; and he had an almost hypnotic power of presenting himself either as an ascetic, stern, strong leader of the nation, or as a kind, humane, warmhearted individual. He exploited his powers of oratory, his capacity for gesture,

even his raving fits, to exert a kind of magnetic spell upon his audience, preventing it from applying common sense to his arguments and dicta. Wholly unscrupulous in the choice of his lieutenants, he dominated them by craftily playing one against another. That he believed implicitly in himself and his "mission" there can be no doubt. Consult Hitler, A Biography, K. Heiden, 1938; Last Days of Hitler, H. R. Trevor-Roper, 1947; Hitler's Table Talk, M. Bormann, Eng. trans., 1953; The Hitler I Knew, Otto Dietrich, Eng. trans., 1957.

Hitler Line. German defence zone of the Second Great War in Italy, secondary to the Gustav line (*q.v.*). It lay across the Liri valley with its right flank resting on Mt. Fammara, its left on Mt. Cairo. See Italy, Campaign in, 1943–45.

Hitler Youth. German organization created by and affiliated to

the National Socialist party. After Hitler's seizure of power, in 1933, it embraced virtually every German child and young person, all Christian, Socialist, and other young people's societies being abolished. It provided physical training, but its chief purpose was the indoctrination of members with Nazism. It was divided into *Jungfolk*, aged 8 to 14, *Hitler Jugend*, the Hitler Youth proper, boys from about 14 to 18, and *Bund Deutscher Mädel*, for German girls. The first Reich leader was Baldur von Schirach; the second, from 1938, Arthur Axmann. It disappeared, with the National Socialist party, when the Allies occupied Germany, 1945.

Hitopadesa. Sanskrit collection of animal stories told with moral purpose, the title signifying "salutary counsel." It is a popular summary of the Panchatantra (*q.v.*).

HITTITES: AN ANCIENT PEOPLE OF ASIA

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This is the story of a people who in the second millennium B.C. migrated into Western Asia from an unknown starting point and ruled a considerable empire there for seven hundred years. See also Hurrians; Kassites; Ugarit, etc.; and entries concerning Hittite sites, e.g. Boghazkoi; Karatepe; rulers, etc.

The Hittites were an ancient people who for seven centuries during the second millennium B.C. ruled a considerable empire comprising at its height most of Anatolia (Asia Minor), north Syria and part of the Armenian plateau. The date of their arrival in Anatolia is not exactly known, but it may have been a little before 1900 B.C. Nor can their place of origin be named, nor the direction whence they came. They were of Indo-European speech and their migration, together with the immigration into Asia Minor of other peoples of kindred speech such as the Luvians, was probably in some degree related to the migration of the Aryans into India and the movement of the Hurrians and the Kassites into the civilized regions of the Near East at approximately the same time.

The Hittites seem at first to have been ignorant of writing. They adopted two systems; one, a hieroglyphic system composed of pictographs, possibly the script of the Hatti, or pre-Hittite, inhabitants of Anatolia, was used on monuments and for religious writings; the other, Babylonian cuneiform, was the official script for literature, historical records, and everyday business. Some thousands of clay tablets in cuneiform Hittite were discovered during the excavations

of the German Oriental Society over a number of years at the Hittite capital Hattusas (mod. Boghazkoi); their decipherment is due chiefly to the work of the Czech scholar Bedřich Hrozný (1879–1952). The publication of these texts revealed much of the history, social customs, laws, and mythology of this remarkable people, the first to keep annals; fragments which survive give the main events of a reign year by year. Hieroglyphic Hittite proved more difficult to read; but the discovery in 1930 of a bilingual at Karatepe helped in the task.

Early Hittite kings, Bithanas and Anittas, established first at Nešas in the kingdom of Kussar (near mod. Kaisari), captured the city Hattusas in the 19th century B.C., and made it their capital. They rapidly spread their conquests over most of Anatolia—an expansion attributed by tradition to a 17th-century king Labarnas, from whom the royal house derived.

IN SYRIA. The Hittites emerge into the stream of history when king Murshili I, having crossed the Taurus Mts. and conquered Aleppo and Carchemish c. 1600 B.C., marched down the Euphrates and sacked Babylon, putting an end to the Amorite dynasty there (the descendants of Hammurabi).



Hittites. Part of the band of sculpture carved into the rock which adorned the open-air sanctuary of the Hittite mother-goddess. Among the rites celebrated in this shrine was the "divine marriage" of Ma with Teshub, the warrior god: he is represented in various guises on the rocky walls

They never succeeded in repeating this spectacular feat of arms, but in the 15th and 14th centuries they again established control over Aleppo and interfered persistently in the affairs of N. Syria, contesting with the Egyptians and Hurrians in that area for mastery of the rich Orontes valley and the vital trading centres of N. Syria and the Phoenician coast.

King Shubbiluliuma (c. 1375-1345 B.C.), by a masterly policy combining intrigue with swift action, succeeded in wresting most of Syria from Egyptian control and contrived that his son-in-law Mattiawaza should rule Mitanni (*q.v.*) as his vassal. The Tell el-Amarna letters are witness to the extent of Hittite encroachment among territories still nominally subject to Egypt; while documents from Ugarit (*q.v.*) show its kings to have paid tribute to the Great King of Hatti. In the Bekaa they held Kadesh as an outpost; Seti I of Egypt warred unsuccessfully to

drive them from this erstwhile Egyptian fortress, and in the reign of his son Rameses II a great battle between the Egyptians and a Hittite confederation led by the Hittite king Muwatallish nearly ended in disaster for Egypt. Thenceforward hostilities ceased, and in c. 1270 B.C., in face of possible attack from the growing might of Assyria, a peace treaty was drawn up of which both Hittite and Egyptian versions are extant; the pact was cemented by the marriage of Pharaoh to the daughter of the Hittite king Hattushilish III.

IN ASIA MINOR. The full extent of Hittite domination here is imperfectly known, but in a series of hard-fought campaigns the kings of the Hittite empire during the 15th-13th centuries B.C. must have extended their sway over most of the Anatolian plateau and westwards over the Arzawa lands, the fertile river valleys of the Maeander and Hermus rivers, the Lukka lands (Lycia), and part of

the western seaboard (Millawanda may be the later Miletus, and Karkisa Caria). A formidable rival was Ahhiawa, possibly already the abode of Achaean Greeks. Wilusa, which may be Ilion, the plain of Troy, was another western neighbour. To the N.E. the wars of the Hittites seem to have been chiefly defensive; they were threatened by the savage Gasgas hordes who more than once overran the homeland. But it was probably from the west that the final blow came. Shortly before 1200 B.C. the records cease at Boghazkoi, and the wealthy, heavily fortified cities of Anatolia were sacked and burned. The invaders may have been the Mushki, the Moschoi, or Phrygians who, according to tradition, came from Thrace and were thus European invaders of Asiatic soil.

THE SYRO-HITTITES. Beyond the limits of Phrygian domination, to the S.E. over the Taurus Mts., ethnic elements from the old



Hittites. Carved stone panels showing a Hittite king and his son and others of the royal family going out to welcome home a conquering army. In the third panel a nurse carries the infant of the house and leads a pet animal whose name is inscribed above its head

Hittite empire carried on the traditions of their civilization in the 1st millennium and continued to use the hieroglyphic Hittite script. None of the monuments of these "Neo-Hittite" or "Syro-Hittite" kings can be dated earlier than the 10th century B.C., but the palace sculptures from the cities Carchemish, Hamath, Marash, Sakjegeuzi, Karatepe, etc., depicting life at court, shipping, hunting, musicians, soldiers, as well as mythical figures, show the survival of an artistic and religious tradition; while the partial decipherment of the script shows royal names such as Labarnas, Shubuiluliuma, Hattushilish still borne by these later kings. Gradually their dynasties gave way to those of Aramaeans of Semitic speech, and they in turn became vassals of the expanding Assyrian empire; but the Assyrians to the

oil, peas, and beans were among the staples of diet. Woollen clothes were worn in the severe Anatolian winter, and so sheep farming was an important industry.

SOCIAL ORGANIZATION. Little survives of Hittite monumental art save a few monolithic doorways and large rock figures of deities indifferently carved; but the Boghazkoi texts tell much of the social structure of the state. The king was at once religious head and temporal ruler of his people, and the leader of his armies. His edicts were law, his power absolute. In some conquered countries he installed his sons as vassal kings; in others a treaty bound the vanquished ruler in fealty to "my Sun," as protocol named the Great King. Hittite queens had much influence; queen Pudukhepa, the Hurrian wife of Hattushilish III, introduced radical changes into the court and state religion, and in the time of Murshilish II the queen mother was banished as being a danger to the state. The royal domains were very large, much land being held in fee by military colonists or liegemen.

Hittite Laws

Many fragments of a Hittite code of laws survive. In some respects the laws are more humane than those of Babylonia or Assyria, since they prescribe fines rather than bodily mutilation for theft and assault, and banishment instead of execution for treason. The idea of collective responsibility of a community for the crime of one member has been replaced by that of individual responsibility.

Hittite family organization seems to have been very like that of other countries of the time. A bride received a gift from her groom as well as a dowry from her father. Marriage between near relatives was prohibited except in levirate marriage where Hittite custom resembled the Hebrew, and royal brother-sister unions, in which, for dynastic reasons, Egyptian custom prevailed.

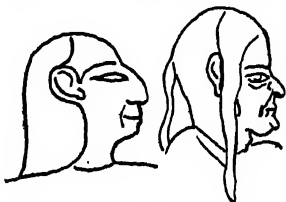
WARFARE. The Hittites, like the Assyrians, were a military people of high efficiency. They owed their survival in the midst of hostile and bellicose neighbours to a strong army organization and the development of new weapons and new techniques of warfare, the chief of which were siegecraft, mountain warfare, and the use of the horse and chariot, in the last of which they may have been indebted to the Hurrians. Every year the king at the head of his army would set

out on campaign; defeated rulers would provide tribute and auxiliaries to swell the fighting force of their conquerors: the Hittite army that opposed the Egyptians at Kadesh contained forces drawn from almost every part of Asia Minor and Syria.

RELIGION. From a myriad local cults centring round a spring deity, or a weather-god symbolising the rainstorms which sweep the plateau and bring both destruction and fertility, the Hittites created an official pantheon at the head of which was the sun-goddess of a shrine Arinna not far from Hattusas. She was the king's protectress and was called "queen of heaven and earth, mistress of the kings and queens of the land of Hatti." Other great national deities were Telepinus, a vegetation god, a sun-god, and a storm-god who was the consort of the sun-goddess. The pantheon was constantly expanding to include the deities of conquered peoples, and it embraced also Hurrian deities Kumarbi, father of the gods, the divine triad Teshub, Khopet, and Sharma, the goddess Shaushka, and others; a number of gods of Babylonian origin; and the Luvian cycle Santas and Kupapa, the prototype of Cybele, and Tarkhond whose names survived in Etruscan. A number of myths have survived; some have affinities with the myths of Babylonia and Sumer, and one, the epic of Kumarbi, bears striking resemblance to the theology of the early Greek poet Hesiod and may be an earlier version of it. To Babylonian influence may be attributed the practice of divination, especially by hepatoscopy (the scrutiny of the liver of sacrificial animals).

Outdoor Sanctuaries

Hittite deities were worshipped in simple outdoor sanctuaries, on hilltops, or by springs or streams, or in elaborate stonebuilt temples with all the paraphernalia of an organized cult. As in Egypt, a staff of priests attended the god's wants; they lived in the temple, and subsisted on the offerings and tithes brought by worshippers. Scrupulous observance of ritual characterised the cult, and much stress was laid on ritual purity; the king's daily life was hedged about with taboos. Best known of the shrines is Yasilykaya, a rock-sanctuary 2 m. from Hattusas, which is sculptured with processions of deities from the Hurrian pantheon brought into prominence by queen Pudukhepa. *Consult The*



Hittite faces

end referred to this part of their dominions, and in particular Carchemish, as "Hittite-land."

HITTITE CIVILIZATION. The physical appearance of the Hittites is known from their monuments, and from representations by Egyptian artists of their foes. Characteristic of at least the ruling element is the prominent nose, high cheek bones, curious flattened skull, and pigtail, the short tunic, conical cap, and upcurved shoes.

Metal Working

Typical weapons were the dirk and double axe and the light horse-drawn chariot with crew of three. They were great metallurgists; the Taurus and the Anatolian plateau are rich in copper, gold, silver, lead, and iron, and the smelting of iron in particular may have originated here, though at the time of the Hittite empire iron was still a rare and precious commodity. As in other countries of the ancient Near East, silver was the medium of exchange; tables exist of prices of domestic animals and comestibles reckoned in terms of silver shekels. Agriculture was the basis of the Hittite economy. Barley and wheat, the grape vine, vegetables, and fruit trees were cultivated, and

Hittite Empire, J. Garstang, 1929; Les Hittites, L. Delaporte, 1936; The Hittite Laws, E. Neufeld, 1951; The Hittites, O. R. Gurney, 1952; Early Anatolia, Seton Lloyd, 1956.

Hivites. One of the ancient tribes driven out of their territory by the Hebrews on their invasion of Palestine. Gibeon and Shechem were two of their chief centres.

Ho. Primitive forest tribe in the Singbhum district of Chota Nagpur, Bihar state, India. Skilful archers, numbering perhaps 500,000, they speak a Munda dialect and show less Hindu influence than the related Santals.

Hoadley, BENJAMIN (1676–1761). English prelate. Born at Westerham, Kent, Nov. 14, 1676, he was educated at Catharine Hall, Cambridge. A strong politician, he supported the accession of the house of Hanover to the British throne, being rewarded with the bishoprics successively of Bangor, Hereford, Salisbury, and Winchester. He was a thorough-going Erastian, and his theological views were nearly akin to those of the Unitarians. One of his sermons led to the Bangorian Controversy (*q.v.*), in which Hoadley held that sincerity was the true basis of Christianity. He died at Chelsea, April 17, 1761.

Hoare-Laval Pact. Proposals put forward, Dec., 1935, by Sir Samuel Hoare (afterwards Viscount Templewood, *q.v.*), U.K. foreign secretary, and Pierre Laval, French foreign minister, for ending the Italo-Abyssinian War. Their recommendation that Abyssinia should surrender territory to Italy appeared to reward aggression, and the proposals were so widely and bitterly attacked that on Dec. 18 Hoare resigned and on the 19th the premier, Stanley Baldwin, declared that "these proposals are absolutely and completely dead."

Hoare's Bank. Business founded in Cheapside c. 1672 by Richard Hoare (1648–1718), a London goldsmith and banker (knighted in 1702), and maintained by his descendants on the site in Fleet Street (no. 37) to which he moved in 1690. The premises, rebuilt in 1829, were extended in 1929. Samuel Pepys, John Evelyn, Godfrey Kneller, Hans Sloane were among the bank's early customers. Abigail Masham (Hill) brought Queen Anne's privy purse account to Hoare's Bank in 1710; and Charlotte, queen of George III, had an account here. The founder's great-grandson, another Richard (1735 N.S.–1787), was made a



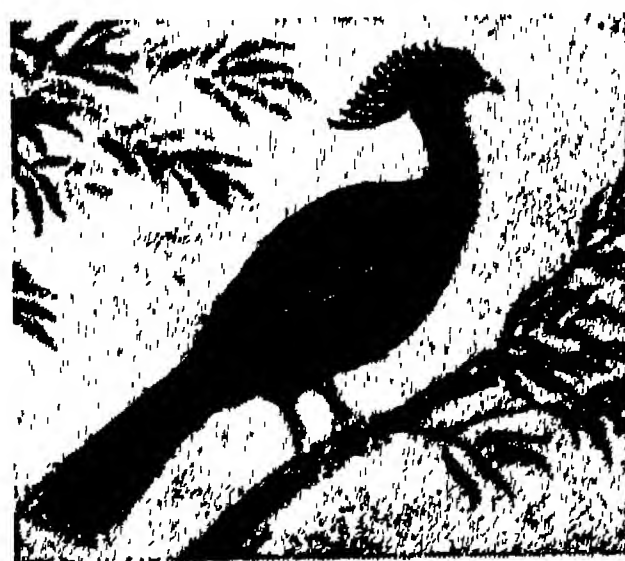
Hobart, Tasmania. View of the city, with Mt. Wellington in the background

baronet in 1786. The firm, formerly a partnership, was converted into an unlimited liability co. in 1929. See Banking illus. in p. 917. Consult Hoare's Bank, Collins, rev. ed. 1955.

Hoar Frost (A.S. *har*, white). Deposition of ice particles on surfaces when the dew point is below 32° F. The ice particles or crystals readily form like needles and feathers on the branches of trees, leaves of grass, etc. The heaviest hoar frosts are formed when the heaviest dews occur, on clear, calm nights, when radiation is little impeded. No distinction is made between frozen dew and ice formed directly from cooled water vapour.

Hoar-stone. Unhewn pillar-stone, standing alone, often hoary with lichen. It is usually a Neolithic menhir, sometimes with the derivative purpose of a memorial or landmark, such as the Haranstan of the Ethelwulf charter of A.D. 847. The word designates two Worcestershire hamlets, a Gloucestershire menhir, and a long barrow at Duntisborne Abbots.

Hoatzin. South American bird, (*Opisthocomus cristatus*, length 2 ft. Plumage is almost black, with olive sheen, many of the feathers whitish-edged; breast light russet; long black tail buff-tipped; erectile crest russet-brown; eyes red, with black lashes. Nestlings have a pair of claws on each wing.



Hoatzin. S. American bird

Hobart. Capital and second oldest city in Tasmania, Australia. It is situated on the S. side of the island at the foot of Mt. Wellington, on the Derwent, 12 m. from its mouth. It is a port of call for European mail steamers and for Australian inter-state steamship liners, and is the rly. centre for Tasmania. Its beautiful harbour, deep and well sheltered, gives a fine setting to the city and its government house, parliament, university, and other fine public buildings. Industries include tanneries, foundries, sawmills, breweries, flour mills, and fruit-preserving factories; the principal exports are apples, jam, tin, zinc, copper, newsprint, and timber. Hobart's climate, comparable to that of southern England, and its beautiful surroundings attract visitors from the mainland. Pop. (1954) 95,206.

Hobart-Hampden, AUGUSTUS CHARLES (1822–86). British sailor. The third son of the 6th earl of Buckinghamshire, he was born April 1, 1822, and entered the navy in 1835. He served in the Baltic against Russia during the Crimean War, 1854–56. Captain in 1863, he retired on half-pay and, being a keen partisan of the Secessionists in the American Civil War, obtained the command of a blockade runner. In 1867 he became naval adviser to the sultan of Turkey, and was promoted admiral and pasha in 1869. Hobart Pasha, as he was now called, reorganized the Turkish navy. He died at Milan, June 19, 1886.

Hobbema, MEINDERT (1638–1709). Dutch painter, born at Amsterdam, Oct. 31, 1638. He was the friend, possibly the pupil, of Ruysdael, whom he accompanied on painting expeditions, and though ignored by patrons enjoyed the friendship of Wouverman and the van de Velde, who painted figures and animals for



Hobbema. The Avenue. Middeltharnis, Holland, the most famous example of the work of this Dutch landscape painter. It was painted in 1689
National Gallery, London

his compositions. The period of his activity lasted till about 1669, when he took an official post, dying at his birthplace Dec. 7, 1709. Essentially a painter of quiet landscape, Hobbema was a master of intimate detail and firm draughtsmanship.

Hobbes, JOHN OLIVER. Pen-name of P. M. T. Craigie (q.v.).

Hobbes, THOMAS (1588-1679). English philosopher. Born at Malmesbury, April 5, 1588, and educated at Magdalen Hall, Oxford, he became in 1610 tutor to the grandson of the duke of Devonshire. The connexion thus formed with the Cavendish family was maintained intermittently during the rest of his life. His next pupil was the son of Sir Gervase Clifton, and in 1631 he became tutor to the son of his first pupil. On each occasion a Continental tour was part of the scheme of education. Both at home and abroad Hobbes met some of the most eminent men of the time—e.g. Jonson, Bacon, Galileo, Descartes, Selden.

His first objects of study were classics and mathematics; and in 1628 he issued a translation of Thucydides. But it is as a political philosopher that Hobbes is chiefly remembered. In 1640 he wrote a defence of monarchy, published later as two separate treatises entitled *Human Nature* and *De Corpore Politico* (concerning the body politic). Hobbes thought it wise to leave England after this revelation of his opinions, and spent the next eleven years abroad. He returned to England in 1651, made his peace with the Commonwealth govt., and after the Restoration received a pension from

Charles II, whose mathematical tutor he had been, 1646-48. In 1651 his greatest work, *The Leviathan*, appeared; its political theories were acceptable to the monarchy, but the Church accused its author of atheism. Hobbes died at Hardwicke, Dec. 4, 1679.

In his system of ethics, Hobbes reduces everything to terms of self-interest, e.g. friendship is merely the sense of mutual dependence, and religion is essentially fear of inscrutable powers. He conceived mankind as living originally in a state of anarchy in which "the whole life of man is solitary, poor, nasty, brutish, and short." To abolish this anarchy and its resultant evils individuals agreed to resign their rights to a sovereign power, not necessarily one man, and the sovereignty thus created for the common weal must be despotic and irrevocable. This political theory, though partly vitiated by the fact that it is unhistorical, exercised an extraordinary though chiefly negative influence upon subsequent thinkers. Hobbes's style is unadorned but clear and forceful. *Consult* Lives. Leslie Stephen. 1904; J. Laird. 1934.

Hobbs, SIR JOHN BERRY (b. 1882). English cricketer. Born



Jack Hobbs, English cricketer

at Cambridge, Dec. 16, 1882, son of a groundsman at Fenner's, he was cricket coach at Bedford grammar school at 19. Encouraged by Tom Hayward, he became a

professional player, offering himself to Essex, which declined, but being accepted by Surrey in 1903. Probably the most attractive as well as consistent batsman who ever opened an innings, by 1907 he was playing for England at Melbourne, Australia. His career, lasting until 1934, brought him over 60,000 runs, including 197 centuries, both unparalleled achievements. A remarkable year for Hobbs was 1925, when he headed the averages, totalled 3,024 runs, made 16 centuries (a record which stood 22 years), and passed Grace's tally of 126 centuries. His highest innings was 316 not out, at Lord's in 1926, a record for the ground. The last of his 41 appearances against the Australians was at the age of 47. As a fieldsman at cover point he was unsurpassed. He was knighted in 1953. Hobbs wrote several books of reminiscences, notably *My Life Story*, 1935. He contributed the article on Cricket to this Encyclopedia.

Hobby (*Falco subbuteo*). Migratory falcon found in the southern districts of England during the summer. Of graceful shape, about a foot in length, and of reddish colour with white throat and breast, it feeds upon small birds and insects and is useful to the agriculturist. It was formerly used in hawking (q.v.).

Hobby-Horse. Old-time feature at fairs, pageants, and other popular festivities. It consisted of a gaudily coloured pasteboard or wooden figure of the head and hind quarters of a caparisoned horse girt round the waist of a performer, who imitated the curvettings of the animal.

The character appears with the other persons of the morris dance on a painted window of a house at Botley, Staffs. "Hobby-horse" was one of the names given to the "draisive," an early form of bicycle propelled by the feet, invented by Baron von Drais, and also denotes a toy horse, and the horse of the merry-go-round.

Hobgoblin. Traditional elf or goblin, generally of terrifying appearance. The prefix, Hob, is probably a corruption of Robin, and the name may have originally represented only the Robin Good-fellow of English folklore.

Hoboken. City of New Jersey, U.S.A., in Hudson co. It stands on the W. of the Hudson river, adjoining Jersey City and opposite New York, with which it is connected by ferries, the Hudson and Manhattan tubes, and the Holland

tunnel. It is a terminus of several rlys. With an area of 1.3 sq. m. and a pop. (1950) of 50,676, including Italian, German, Irish, and Polish elements, Hoboken is the most densely populated city in the U.S.A.

Hoboken occupies the site of a Dutch farm razed by the Indians in 1643. It was laid out as a town in 1804, incorporated 1849, and received its charter in 1855. Once fashionable, it is now an industrial and shipping centre, with foundries, light and heavy engineering works, and factories for leather, silk, chemicals, pencils, and waterproof fabrics. During the First Great War it was the chief troop embarkation point. A dock fire in 1900 caused damage valued at £2,500,000.

Hobson, RICHMOND PEARSON (1870-1937). U.S. sailor. Born in Alabama, Aug. 17, 1870, he was educated at the U.S. naval academy, afterwards studying for his profession in Paris. He became a constructor, but saw active service in the war against Spain, being at the bombardment of Matanzas and the expedition against San Juan de Puerto. His great exploit was sinking the Merrimac on June 3, 1898, at the entrance to Santiago Harbour, this being an attempt to shut in the Spanish fleet. This feat made him the idol of America. In 1903 he retired from the service, and during 1906-15 sat in congress for Alabama. He died in 1937.

Hobson, THOMAS (c. 1544-1631). Cambridge carrier and livery-stable keeper. His invariable refusal to allow any horse to be taken from his stables except in its proper turn is said to have given rise to the expression, Hobson's choice, *i.e.* take it or leave it. He continued his journeys to London until 1630, when they were suspended on account of the plague. Milton wrote two humorous epitaphs on him, and a street and conduit in Cambridge are named after him.

Hobson-Jobson. Anglo-Indian term denoting a native festal excitement, especially during the Moharram celebration of the death of two of Mahomet's grandsons. It is the British soldiers' version, traceable back to 1829, of the wailing cry Ya Hasan, Ya Hosain. Earlier variants were Hossy Gossy, 1673; Hossein Jossein, 1720; and the Dutch Jaksom Baksom, 1726. The term was chosen by Sir H. Yule and A. C. Burnell as the title of their glossary of colloquial Anglo-Indian words and phrases, rev. ed. 1903.

Hocze, LAZARE (1768-97). A French soldier. Born near Versailles, June 25, 1768, he was in the



A Hoche

Guard before the Revolution. He remained in the army after the fall of the monarchy, and in 1792 became an officer. Almost at once he was made a general and placed at the head of an army. In the winter of 1793-94 he won several brilliant victories over the Austrians and Russians, but was imprisoned as a traitor. He was speedily released and in the field against the royalists in arms in La Vendée. Hoche was successful there, but met with failure when he organized and led an expedition to invade Ireland in 1796. He was afterwards in a command on the Rhine. Hoche had just resigned the post of minister for war when he died at Wetzlar, Sept. 19, 1797. It was thought that his career might have rivalled Bonaparte's had he lived, and he was one of the more attractive figures of the Revolution.

Hochelaga. North American Indian village, the home of the Hochelaga or Beaver Indians, which was discovered by Jacques Cartier in 1535. On its site the Ville Marie de Montreal (later called Montreal) was founded by Paul de Chomédy, Sieur de Maisonneuve, in 1642.

Hochkirch OR HOCHKIRCHEN, BATTLE OF. Fought during the Seven Years' War, Oct. 14, 1758, between the Prussians on the one side and the Austrians and their allies on the other. Hochkirch is a village near Dresden. After his victory over the Russians at Zorndorf on Aug. 25, Frederick the Great hastened to the help of his brother Henry, whose army covering Dresden was faced by a much stronger one. Frederick decided to attack, but by a coincidence, Daun, the Austrian leader, made the same resolve. The result was a desperate encounter on the morning of Oct. 14, the Austrians having used the night to surround their foes. The Prussians fought well but were driven from the field, leaving many guns as spoil. They lost about 10,000 men out of 40,000 engaged; the Austrians 7,500 out of 80,000-90,000. See Seven Years' War.

Höchst. German town, on the Main, at its junction with the Nidda. It was a co. when incor-

porated in 1928 as a borough with Frankfort. Originally a Carolingian settlement, it has a church, S. Justinus, dating from the 9th century, a monastery of 1441, and a partly destroyed castle that was a residence of the Mainz archbishop-electors. It was the seat of one of the three main plants of the I.G. chemical trust, and of great engineering works, as well as of one of the early factories of fine porcelain (1746-98). Here in 1622 the Imperialists under Tilly defeated the Protestants; and in 1795 the Austrians, the French.

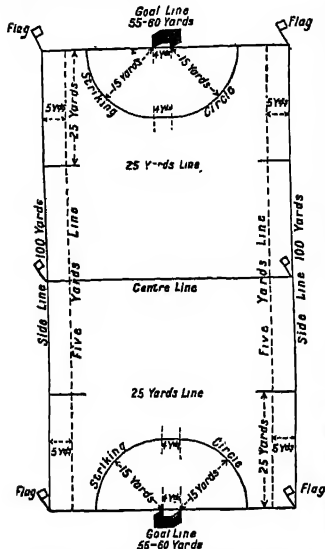
Höchstädt. An old Bavarian town on the Danube, 55 m. N.W. of Munich, at a height of 1,400 ft. It has two Gothic churches of the 12th and 13th centuries, and a castle of the 16th. Industry is connected with agriculture. Höchstädt is known in connexion with the battle called by the English Blenheim (after the village of Blindheim), Aug. 13, 1704. Pop. 2,186. See Blenheim, Battle of.

Hock. German white wine, grown in the Rhine district and locally known as *Hochheimer*, from Hochheim, on the Main. The anglicised name hock is now applied generally to all Rhine white wines. Most of these can be had either still or sparkling, among the best of the former being Liebfraumilch and Marcobrunn; of the latter, Johannisberg, Liebfraumilch, and Ehrenbreitstein. Hock has a characteristic flavour and bouquet; it is a full-bodied, stable wine, containing 9-12 p.c. alcohol. Similar wines, made in Australia, California and elsewhere from the hock or Riesling vine, are usually sweeter than the Rhine wines.

Hockey (Eng. hook; Fr. *hoquet*, crook). Outdoor game played for centuries in various countries under various names. In Ireland a similar game is known as hurley, in Scotland as shinty, in Wales as bandy. The earliest form of the game is traceable to Ireland, and appears to have been originally played by one individual against another. The Irish game is referred to in the will of the first Irish king, Cathair Moir (d. 177). Cathair gave Crimthaun 50 hurling balls made of brass, with an equal number of hurlets.

There is an altar pot in the Copenhagen national museum made c. 1333, on which are depicted two hockey players with sticks and a ball, apparently bullying in the modern style. In a wall built at Athens by Themistocles (514-449 B.C.) a bas-relief has been found showing two

youths with hooked sticks similarly engaged, two others behind them holding hooked sticks. Fourteenth-century windows in Canterbury and Gloucester cathedrals show a boy striking a ball with a hooked stick.



Hockey. Plan of the field with dimensions laid down by the Hockey Association

As now played, hockey became a recognized game about 1883, when a standard set of rules was framed by a Wimbledon club. In the same year the game was adopted by Cambridge university, and later by Oxford; the first inter-varsity match being played in 1890. On Jan. 18, 1886, representatives of eight clubs met at the Holborn Restaurant, London, and the Hockey Association was founded, its principal object being to consider draft rules. The organization of the association gave a great impetus to the game, and Irish, Welsh, and Scottish, as well as English divisional and county associations quickly sprang into existence.

Representative games were started in 1890, teams from the N. and S. of England being opposed. In 1895 the first international game was decided, England defeating Ireland at Richmond by five goals to nil. In 1900 an international board was formed to make and alter rules of the game. The hockey associations of England, Ireland, Scotland, and Wales all appoint representatives to the board, which is under their control. Hockey is included in the Olympic games.

Hockey is played between two teams of not more than eleven players each. The object of the game is to force the ball into the opponents' goal. The team scoring the most goals wins. Correct formation of a team is five forwards, three half-backs, two backs, and a goalkeeper. A game lasts 70 mins., the teams changing ends after 35 mins. The dimensions of the ground are: length, 100 yds., breadth, 55-60 yds. It is rectangular, as in football, the longer boundary lines being called side-lines and the shorter, goal-lines. The goals are 12 ft. wide and 7 ft. high, and should be fitted with good nets.

In front of each goal is drawn a line 4 yds. long and 3 ins. wide parallel to and 15 yds. from the goal-line. This line is continued at both ends to the goal-line by drawing quarter circles (3 ins. wide) with the goal-posts as centres. This constitutes the

striking circle. The ball is of the same size as a cricket ball, covered in white leather or leather painted white; it may be seamless or sewn. The sticks are of ash, have a flat front surface and curved blade, and may not weigh more than 28 oz. They must pass through a ring with a diameter of 2 ins.

Outline of Play

Bully. The game is started by a bully in the centre of the ground. One player from each team takes part in the bully. They stand squarely facing the side-lines. Each taps first the ground on his own side of the ball and then his opponent's stick three times alternately, after which one of them must play the ball with his stick, before it is put into general play.

Goal. A goal is scored when the ball passes between the uprights below the cross-bar, and wholly over the goal-line, the ball having been hit or touched by the stick of



Hockey. Typical scenes in the game. 1. The bully off. 2. A player secures the ball. 3. Play near the goal. 4. Goalkeeper effecting a clearance. 5. A stiff tussle in mid-field

an attacker while within the striking circle.

Corners. When the ball is sent over the goal-line by or off an attacker or by a defender unintentionally from a distance of 25 yds. or more from the goal-line, a bully takes place 25 yds. from the goal-line in a direct line from where the ball went over. When a defending player sends the ball over his own goal-line unintentionally from a distance of less than 25 yds. from the goal-line, the penalty is a corner hit. This is a free hit by an attacker (usually an outside-forward) from a point on the back-line or side-line not more than 3 yds. from the corner flag. If the ball is sent intentionally over the back-line by or off a defender, a penalty corner is given: taken from any spot on the defenders' goal-line on either side of the goal, but not within 10 yds. of a goal-post.

All defenders must stand behind their goal-line, attackers outside the circle. From a corner hit no shot at a goal may be made until the ball has been stopped (not necessarily motionless) by an attacker or hit after it has struck or been played by a defender.

Roll-In. When the ball is played over either side-line, it is rolled in, not bounced, by a player of the opposing team from the point on the line at which it left the field of play, no other players standing between the side-line and the 7-yds. line.

Offside. A player is offside when the ball is hit or rolled in unless there are at least three opponents between him and his opponents' goal, or the striker or roller-in be nearer to the opponents' goal-line. Penalty, a free hit to the opposing team at the spot where the offence occurred. No player can be offside in his own half of the field.

Offences. The rules, in the interests of the game and of safety, place various restrictions on the manner in which the game is to be played, in addition to those (e.g. offside) mentioned above. They are: a player (1) may use only the flat face of the stick for playing the ball; (2) may not play left-handed; (3) may not raise his stick above his shoulder; (4) may not undercut the ball; (5) may not intentionally use any part of his body, except his hand, to stop the ball; (6) may not kick or carry the ball; (7) may not hook, hold, or strike at an opponent or his stick; (8) may not obstruct an opponent by interposing his body or stick to prevent the opponent from play-

ing the ball; (9) may not interfere with the game unless with stick in hand.

The goalkeeper is permitted to kick, but only when in the striking circle; dangerous or rough play is not permitted.

The umpire is to refrain from enforcing a penalty where it would be giving an advantage to the offending team.

Penalties. In breaches outside the circle, a free hit is awarded to the opposing team. Inside the circle for a breach by an attacker, a free hit is also awarded. For a breach by a defender in the circle, a penalty corner or a penalty bully is awarded to the attacking team. For a simultaneous breach, the game is restarted by a bully on the spot where the breach occurred, except that no such bully is to be played within 5 yds. of the goal-line. A penalty bully is awarded for an intentional breach by a defender in the circle to prevent a goal from being scored, or where a goal would probably have been scored had an unintentional breach not occurred.

The penalty bully is taken by the offender (unless he has been incapacitated or suspended), and any attacker on a spot 5 yds. in front of the centre of the goal-line. Until completion of the bully, all the other players remain outside the nearer 25 yds. line.

If during the bully the ball pass wholly (1) over the goal-line or under the cross-bar, off the stick of the attacker or stick or person of the defender, a goal is scored; (2) over any part of the goal-line within the circle, off the stick or person of the defender, the bully is taken again; (3) outside the circle in all other cases, the game is restarted by a bully at the centre of the nearer 25 yds. line.

In case of a breach during the bully (a) by the attacker, the game is restarted by a bully at the centre of the nearer 25 yds. line; (b) by the defender, a goal is awarded; (c) simultaneously, the bully is re-taken.

D. O. Light

HOCKEY FOR WOMEN. Although originally for men only, hockey was recognized as a suitable pastime for women, and in 1895 the All-England women's hockey association was formed. In the same year ladies' teams from England and Ireland met at Brighton. There are also associations for women's hockey in Ireland, Scotland, Wales, and other countries; most are affiliated to the inter-

national federation of women's hockey associations. The rules of the game are slightly different from those for men. *See also* Hurling; Ice Hockey.

Hocking, JOSEPH (1855-1937). British nonconformist minister and novelist. Born in Cornwall, a brother of Silas Hocking, he was educated at Victoria university, Manchester, and for a time was a land surveyor. In 1884 he became minister of a Methodist church, and was a popular preacher. It is chiefly by his novels that he is generally known, his first story, *Jabez Easterbrook*, 1891, having been followed by at least one work of fiction annually for some 40 years. Many of these attained wide popularity as serials and in volumes. He died March 4, 1937.

Hocking, SILAS KITTO (1850-1935). British novelist. Born in Cornwall, March 24, 1850, and edu-



Silas K. Hocking,
British novelist
Russell

cated privately, he was ordained minister of the United Methodist Church in 1870, and held various pastorates until 1896, when he retired. His first story, *Alec Green*, appeared in 1878,

and was followed by *Her Benny*, 1879, this being the first of a sequence of novels, chiefly of a religious tendency, which enjoyed wide popularity. Hocking twice stood for parliament, and in 1923 published *My Book of Memory*. He died Sept. 15, 1935.

Hockley-in-the-Hole. Former name of Ray Street, Clerkenwell, London, E.C. Notorious in the 17th and 18th centuries as a resort of thieves, highwaymen, bull-baiters, bulldog breeders, and infamous women, it had a bear garden which all classes patronised, where prize-fighting, cock-fighting, wrestling, and duels took place.

Hocktide. Old English holiday observed on the second Monday and Tuesday after Easter. Formerly, in rural districts, Hock Tuesday was one of the days on which rent and other regular charges were paid. On Hock Monday it was the custom for the men to bind with ropes every woman or girl they met, releasing her on payment of a small sum of money, which was given to the Church. On Hock Tuesday the women bound the men.

The custom apparently originated about the 12th century, and

died out early in the 18th. In London in the 15th and 16th centuries Hocktide was called Hobtide. The old Coventry play of Hock Tuesday, performed before Queen Elizabeth at Kenilworth in 1575, represented Saxons fighting with Danes and Saxon women binding and leading the Danes captive.

Hodder & Stoughton. London publishing house, founded by Matthew Hodder and T. W. Stoughton in 1868. In 1902 John Ernest Hodder-Williams, who was knighted in 1919, joined the firm. Initial success was achieved with *From Log Cabin to White House*, a memoir of President Garfield by W. M. Thayer. In 1885 the Rev. (later Sir) William Robertson Nicoll (*q.v.*) became editor in chief and literary adviser. In 1886 he started *The British Weekly*, through which he speedily made himself the chief nonconformist journalist, and a few years afterwards *The Bookman*. The firm became a limited company in 1919 and added several subsidiary book publishing companies through the years. The parent firm developed a large output of fiction, religious books, and biographies. After *The Bookman* was sold in 1935 and *The British Weekly* in 1946, it concentrated entirely on books.

Hoddesdon. Town and (with Broxbourne and Wormley) urban district of Hertfordshire, England. It is on the river Lea, 4 m. S.E. of Hertford, on the railway, and was a fishing resort of Izaak Walton, in whose book it is mentioned. On the N.E. border is the building which gave its name to the Rye House Plot (*q.v.*). Broxbourne Woods cover 300 acres. Market day. Wed. Pop. (1951) 13,728.

Hodeida. Seaport of Arabia. It lies about 150 m. N. by W. of the strait of Bab-el-Mandeb, in the Yemen, on the E. coast of the Red Sea. The Turks had a fort here. It has some trade, exporting coffee, hides, cotton, millet, and senna. It was occupied during the First Great War by a British garrison, which was attacked by the Imam Yehia, head of the Zaidi sect of Muslims, in Aug., 1919. The British evacuated it in Jan., 1921. See Yemen.

Hodge. Character in William Stevenson's comedy, *Gammer Gurton's Needle*, 1575. He is Gammer Gurton's servant and his name, a nickname for Roger, has since served as a conventional designation for an English farm labourer or countryman. Regarded as more or less of a simpleton, he was customarily given things of inferior

quality under the belief that he would not know the difference, hence the hodge razors referred to in Carlyle's *Miscellanies*, which were never meant to shave but only to be sold.

Hodge, JOHN (1855-1937). A British labour leader. Born at Muirkirk, Ayrshire, Oct. 29, 1855, he was educated at Motherwell and Glasgow. He formed and became secretary of the British Steel Smelters' Mill, Iron, and Tinplate Workers' Association; and was president of the T.U.C. in 1892, and of the British section of the international congress at Zürich, 1893. He was elected M.P. for Gorton in 1906, and was minister of labour, 1916-17, transferring then to the ministry of pensions. When the Labour party decided not to join the Lloyd George ministry in 1919, Hodge resigned. He lost his seat in 1923, and died at Bexhill, Aug. 10, 1937. An autobiography, *Workman's Cottage to Windsor Castle*, appeared in 1931.

Hodges, FRANK (1887-1947). British politician. He was born at Woolaston, Glos, April 30, 1887, and went to an elementary school at Abertillery and Ruskin College, Oxford. Having worked as a collier and miners' agent, he became general secretary of the Miners' Federation of Great Britain, 1918-23, and of the Miners' International Federation, 1920-27. In the former capacity he refused to press for a national wages pool during the coal disputes of 1921. Returned to parliament by Lichfield in 1923, he was civil lord of the Admiralty in the first Labour government. Later he left the Labour movement, becoming a director of companies, a member of the Central Electricity Board and of the industrial court. He wrote *My Adventures as a Labour Leader*, 1925. He died June 3, 1947.

Hodgkin, THOMAS (1831-1913). British historian. Born in London, July 29, 1831, of Quaker parentage, Hodgkin was educated at London university and became partner in a bank at Newcastle-on-Tyne. By study he made himself an authority on the so-called Dark Ages. His greatest work is *Italy and her Invaders*, 1880-99; he also wrote *Theodorici the Goth*, 1891; *Life of Charles the Great*, 1897; and *Vol. 1 of Longman's Political History of England*, 1906. He died March 2, 1913.

A son, Robert Howard Hodgkin (b. 1877), was provost, 1937-46, of Queen's College, Oxford, of which he pub. a history, 1949, *Six Centuries of an Oxford College*,

and wrote a standard *History of the Anglo-Saxons*, 1935.

Hodgkin's Disease or LYMPHADENOMA. Disease characterised by gradual enlargement of the lymphatic glands throughout the body. The cause is unknown. Young men are most frequently affected. The glands in the neck are usually the first to become enlarged, and thereafter the condition slowly spreads to those in the armpit, groin, chest, and abdomen. Usually the spleen and liver are enlarged or altered. The patient gradually becomes anaemic, and the pressure of the enlarged glands upon the windpipe may cause difficulty in breathing, or pressure upon the oesophagus difficulty in swallowing. Pressure upon nerves may cause severe pain in various parts of the body. The heart may be displaced, and its action interfered with. Death generally occurs in from one to three years. Sometimes the disease remains stationary for prolonged periods. Complete recovery is rare, but it has been found empirically that certain patients recover who have been in contact with war gases of the mustard group. High protein diet and local application of X-rays are recommended as treatment.

Hodgkinson, EATON (1789-1861). A British mathematician. Born at Anderton, Cheshire, he worked on a farm. In 1811 he moved to Salford, where his aptitude for mathematics gained him admittance to a brilliant scientific circle. In 1822 his paper *On the Transverse Strains and Strength of Materials*, in which he fixed the position of the neutral line in sections of rupture and fracture, was read to the Literary and Philosophical Society of Manchester. To the same body he communicated the result of his studies in the strength of iron beams, which were eventually embodied in the Hodgkinson beam. He was consulted on many engineering problems, *e.g.* by Stephenson with regard to the construction of the Britannia Bridge. He died at Higher Broughton, Manchester, June 18, 1861.

Hodgson, RALPH (b. 1871). An English poet. A Yorkshireman, he worked as a journalist in London, becoming editor of *Fry's Magazine*; was lecturer in English at the Imperial University, Sendai, Japan, 1924-38; later resided in Ohio. His first book, *Last Blackbird* and other poems, appeared in 1907. His poetry is lyrical, direct, and vigorous in

e.g. *The Song of Honour*; inspired by love of animals in *The Bull and The Bells of Heaven*. A popular poem is *Time, You Old Gipsy Man*. Hodgson was awarded the Polignac prize by the National Institute of Arts and Letters, U.S.A., 1946; and the Queen's gold medal for poetry, 1954.

Hodgson, SHADWORTH HOLLWAY (1832–1912). British metaphysician. Born at Boston, Lincs, Dec. 25, 1832, he was educated at Rugby and Oxford. According to him, objectivity is nothing in itself beyond consciousness, but something belonging to consciousness. Existence is presence in consciousness. Physical happenings are not causes, but "real conditions" of psychical happenings. This view he declared to be identical with those put forward in the Platonic dialogue *Parmenides*—that the phenomenal world exists only in so far as it is the manifestation of the idea, that being and thought are the same. The most important of his works are *Time and Space*, 1865; *The Philosophy of Reflection*, 1878; *The Metaphysic of Experience*, 1898. Hodgson, who was president of the Aristotelian Society, died June 13, 1912.

Hódmező-Vásárhely. Town of Hungary, in the co. of Csongrad. It stands on Lake Hodos, near the right bank of the river Tisza (Theiss), from whose floods it is protected by dykes. Modern in appearance, the town has several imposing buildings, including a town hall, hospitals, and a gymnasium. It lies in a fertile agricultural district, and the township includes nearly 300 sq. m. of the surrounding territory. It is noted for a fine breed of horned cattle, and rears horses, sheep, and pigs. There are extensive vineyards in the locality, where choice white and red wines are produced. Cereals, chiefly wheat, oats, barley, maize, and millet, are grown, and brewing, oil refining, and the manufacture of tobacco are carried on. Pop. 61,736, mostly Magyars, two-thirds Protestants.

Hodograph (Gr. *hodos*, way, course; *graphein*, to describe). Curve of which the radius vector represents the magnitude and direction of a moving particle. If from any fixed point lines be drawn at every instant representing in magnitude and direction the velocity of a point describing any path in any manner, the extremities of these lines form a curve which is called the hodograph. It enables many problems of motion to be solved in a simple way.

Hodson, JAMES LANSDALE (1891–1956). British author and journalist. Born at Hazlehurst, Lancs, Aug. 27, 1891, he joined the *Daily Mail* in 1913. After service in the First Great War, he rejoined that paper and became news editor of its northern edition, 1924–29. Later he was a special writer for the *News Chronicle*, *Sunday Times*, and *Allied Newspapers*. A war correspondent 1939–42, he worked on official films including *Desert Victory*, and *Tunisian Victory*. Hodson wrote several novels, e.g. *God's in His Heaven*, 1935; *Carnival at Blackport*, 1937; *Jonathan North*, 1939; *English Family*, 1947; plays, including *Red Night*; *Harvest in the North*. He died in London, Aug. 28, 1956.

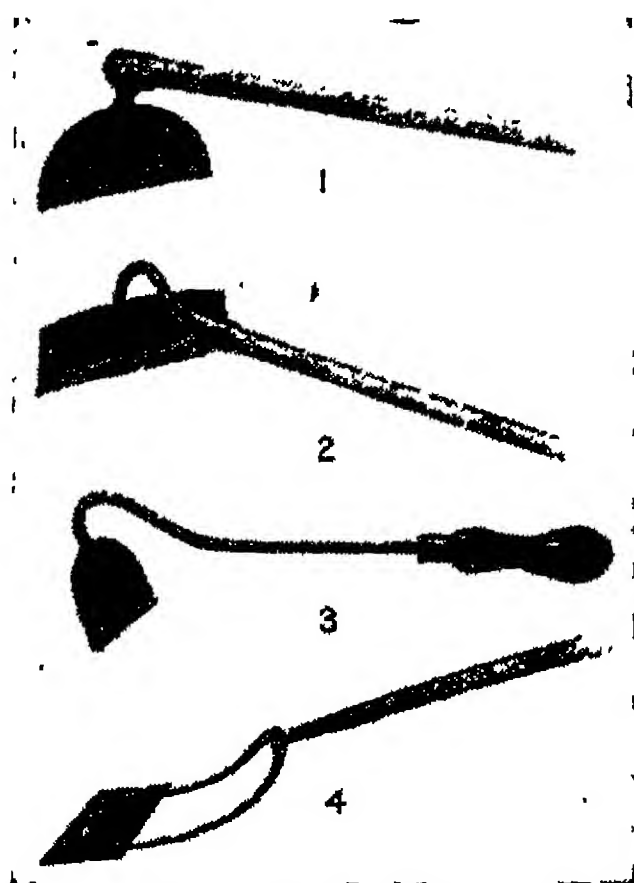
Hodson, WILLIAM STEPHEN RAIKES (1821–58). British soldier. Born at Maisemore Court, near Gloucester, March 19, 1821, and educated at Rugby and Trinity College, Cambridge, he entered the army and proceeded in 1844 to India. Here he gained a unique reputation as adjutant, and eventually as commander of a corps of guides. In 1855, owing to confusion in the regimental accounts, he was removed from his command, but a second court of inquiry cleared his character.

During the Indian Mutiny, Hodson did signal service as commander of a body of irregular cavalry, known as Hodson's Horse, and as chief of the intelligence department. After the taking of Delhi, with only 50 men, he pursued and brought back the Mogul. On the following day, with 100 men, he tracked the princes of Delhi to the tomb where they had taken refuge. The princes surrendered, but as the mob seemed likely to attempt a rescue, Hodson shot the princes one by one with his own hand, an act most adversely criticised. He died near Lucknow, March 12, 1858.

Hodza, MILAN (1878–1944). A Czecho-Slovak politician. Born a subject of the Dual Monarchy, the son of a pastor, he studied law at Budapest and Vienna university, and was elected as a Slovak to the Hungarian parliament in 1905. He was appointed Czecho-Slovak minister to Hungary in 1918 and prime minister of his country in 1935. Advocating co-operation between all the racial elements, but granting autonomy to Ruthenia, he resisted German claims for the cession of the Sudetenland; but on Sept. 20, 1938, he resigned, foreseeing the Munich agreement, whereupon he

retired to Switzerland. Hodza joined the Czecho-Slovak state council in London as vice-president in 1940, but soon resigned. He was in Florida when he died, June 27, 1944.

Hoe. Instrument for breaking up the ground. The hand hoe is best made with a neck curved like



Hoe. Common forms of this garden implement. 1. Half moon. 2. 8-in. steel. 3. Onion hoe with handle. 4. Dutch hoe

that of a swan; the horse-hoe, or grubber, for cultivation between the rows of roots or cereals, may be either a small three-shared machine that can be drawn by one horse, or a larger contrivance with as many as ten tines. The uses of the hoe are to remove weeds, to break up winter cap, and to produce a surface mulch by which the undue evaporation of moisture is prevented. See *Agriculture; Egypt*.

Hoe, RICHARD MARCH (1812–86). American inventor. Born at New York, Sept. 12, 1812, son of



an English emigrant who invented the Hoe printing press. he became a partner in his father's business. He and his two brothers became managers of the firm in 1841, and five years later produced a rotary press, the first of its kind, named Hoe's Lightning Press. An improvement appeared in 1871, which printed on both sides of the paper, which it cut and folded. Hoe died at Florence, June 7, 1886.

Hoenir. One of the three gods in Norse mythology, the long-legged one, the lord of the ooze, synonymous with stork. After

Midgard, the abode of mankind, was formed, Odin, Hoenir, and Lodur made man and woman from an ash and an elm, Hoenir's gift being speech. He is said to have first used the divining rod for revealing hidden waters.

Hoerbiger, HANS (1860-1931). Austrian physicist, born in Vienna Nov. 29, 1860. After having been successful as inventor and technician, he elaborated in *Welteislehre* (Glacial Cosmogony) a theory ascribing the creation and development of celestial bodies to the agglomeration of ice and the reciprocal influence of ice and sun. Much discussed in 1912-14, his teachings were rejected by most astronomers, but continue to exercise some influence.

Hoesch, LEOPOLD VON (1881-1936). German diplomatist. Born June 10, 1881, at Dresden, he came of a family of Ruhr industrialists. After studying law he entered the foreign office in 1907 and served before the First Great War in Peking (Peiping), Paris, Madrid, and London. As chargé d'affaires at Paris, in 1924 he was promoted to ambassador. A sincere advocate of cooperation, he successfully represented the Stressemann-Briand policy. After the death of these statesmen he applied for transfer to London, where as ambassador from Sept., 1932, until his sudden death on April 10, 1936, he won high esteem while incurring the dislike of the Nazi government.

Hoetzsch, OTTO (1876-1946). German historian and politician. Born Feb. 14, 1876, at Leipzig, he became professor at the Posen (Poznan) academy in 1906 and at Berlin in 1920. In the Reichstag, 1919-30, he was a moderate Conservative, leaving his party when its leader Hugenberg began plotting with Hitler. A member of German delegations to Geneva, 1927-30, he approved of the policy of conciliation. He was an authority on Russia, writing popular books on that country and other subjects of contemporary history. Suspected of participation in the July plot of 1944, he suffered persecution by the Nazis, dying Aug. 30, 1946.

Hof. German town, in Bavaria, 30 m. N.N.E. of Baireuth and near the Czech frontier. It is a rly. junction and before the Second Great War was an airport. An industrial centre, it makes textiles, carpets, machinery, china, and preserved foods. Hof became in 1323 the property of the Hohenzollern burgraves; in 1792 fell to

Prussia; in 1810 became Bavarian. Though largely destroyed by fire in 1823, it has three old churches and a Rathaus dating from 1563. Pop. 43,545.

Hofer, ANDREAS (1767-1810). Tirolese patriot. Born at St. Leonard in the Passeier valley, Tirol, Nov. 22, 1767, he inherited his father's business as an innkeeper. In 1797 he enlisted a body of sharpshooters to drive the French from the neighbourhood of Lake Garda, and in 1805 he led his troops against Ney. By the treaty of Pressburg, 1805, Tirol passed into the power of France and was joined to Bavaria, but Hofer led a secret agitation in favour of annexation to Austria. On the outbreak of war between that country and France in 1809, he defeated the Bavarians at Sterzing and Innsbruck, and drove them from Tirol. Lefebvre's army, sent by Napoleon to stamp out this insurrection, was beaten at Berg Isel, but by the terms of the treaty of Schönbrunn Austria abandoned the country to the French, who captured Hofer, took him to Mantua, and there shot him, Feb. 20, 1810.

Höfding, HARALD (1843-1931). Danish author and philosopher. Born in Copenhagen March 11, 1843, he published *German Philosophy* after Hegel in 1872, followed by *Contemporary English Philosophy*, 1874; *The Foundation of Ethics*, 1876; *Charles Darwin*, 1889; *The Ethics of John Stuart Mill*, 1909; and *Henri Bergson's Philosophy*, 1914. There are Eng. trans. of his *History of Modern Philosophy*, 1900; *Brief History of Modern Philosophy*, 1912; and *Modern Philosophy and Lectures on Bergson*, 1915. He died July 2, 1931.

Hoffmann, AUGUST HEINRICH (1798-1874). German poet and scholar. He was born April 2, 1798, at Fallersleben, in Lüneburg, and is hence sometimes known as Hoffmann von Fallersleben. He was librarian at Breslau university, 1823-38, and professor there, 1835-42. The publication of his *Unpolitische Lieder* (Unpolitical songs), 1841-42, caused his dismissal. He produced *Deutschland über Alles*, 1841, which took the position of the national anthem of the German Empire. Versatile and prolific in lyrics inspired by love, wine, patriotism, and good fellowship, he enjoyed a great vogue as a poet. He wrote much on early German literature, hymnology, and philology. Died at Corvei, Jan. 19, 1874.

Hoffmann, ERNST THEODOR AMADEUS (1776-1822). German author. Born at Königsberg, Jan. 24, 1776, he studied law, but



E. T. A. Hoffmann,
German author

spent much time wandering about Germany, supporting himself by writing and portrait painting, composing, and managing provincial theatres. In 1816 he became chancellor of the court of appeal at Berlin, and about this time adopted the name of Amadeus in place of his baptismal Wilhelm, in honour of Mozart, to whom he was devoted. The short stories and essays he had published in 1814-15 in *Phantasiestücke* had been well received, and then a gruesome novel, *Die Elixire des Teufels*, made him famous. *Nachtstücke*, 1817, and *Die Serapionsbrüder*, 1819-21, contain short stories which occupy a prominent place in romantic literature. Hoffmann died June 25, 1822.

Extraordinarily prolific, Hoffmann composed, painted, and wrote with equal grace, and became the centre of a large circle of musical and literary talent. His influence on the work of Schumann was especially marked. Of his own operas, *Undine*, 1816, is best known. Offenbach's opera, *Tales of Hoffmann*, is based on this writer's work.

Hoffmann's Anodyne. Compound spirit of ether, first made by Frederick Hoffmann in the middle of the 18th century. The inventor claimed that his preparation was composed of the dulcified spirit of vitriol (ether) and the aromatic oil which came over after it. He did not state in what proportions he mixed these ingredients. Compound spirit of ether was formerly used as a remedy for gastric flatulence.

Hofmann, AUGUST WILHELM (1818-92). German chemist, born at Giessen, April 8, 1818. He studied chemistry under Liebig in his native town.

In 1845 he was appointed superintendent of the Royal College of Chemistry, London, afterwards incorporated in the Imperial College of Science



A. W. Hofmann,
German chemist

From 1865 he was professor of chemistry in Berlin, until his death, May 5, 1892.

To him is due the discovery of the composition of rosaniline, which was of great technical importance in the early days of the coal-tar colour industry. He discovered a beautiful aniline dye known as Hofmann violet; also allyl alcohol and formaldehyde. The reaction for converting an amide into an amine having one carbon atom less is named after this chemist. After he returned to Germany he founded (1868) a chemical society on the model of the London society.

Hofmannsthal, Hugo von (1874-1929). Austrian poet and librettist. Born in Vienna, Feb. 1, 1874, he was educated at the university there, having published a collection of poems while still a schoolboy. Influenced by Stefan Georg, he founded a romantic school of poetry. His plays, based chiefly on the works of earlier romantics, included *Der Tor und der Tod* (The Fool and Death), 1893; *Oedipus und die Sphinx*, 1906; but he is best known as the librettist for Strauss's operas *Elektra*, *Der Rosenkavalier*, and *Ariadne auf Naxos*. His correspondence with Strauss, trans. P. England, appeared in 1929. He died July 15 that year.

Hofuf. Town of Saudi Arabia, the capital of Hasa. It is situated about 40 m. inland from Ukair on the Persian Gulf, and is on the Pilgrim's Road through Nejd to Mecca. It is one of the urban centres (Mubarratz being the other) in the great oasis in the S. of Hasa. Pop. (est.) 100,000.

Hogarth, David George (1862-1927). British archaeologist. Born at Barton-on-Humber, May 23, 1862, he was educated at Winchester and Magdalen College, Oxford. He carried out explorations in Asia Minor, 1887-94, and excavations in Crete, Egypt, Ephesus, Assiut, and Carchemish. He was director of the British school at Athens, 1897-1900, and succeeded Sir Arthur Evans as keeper of the Ashmolean Museum in 1909. As director of the Arab Bureau he delivered in 1918 to King Hussein of the Hejaz the Hogarth message, in which Great Britain stated that the Palestine problem should be solved by Arab and Jewish co-operation. His works include *Modern and Ancient Roads in E. Asia Minor*, 1892; *The Nearer East*, 1902; *The Archaic Artemisia of Ephesus*, 1908; *Ionia and the East*, 1909; *The Ancient East*,

1914; *Arabia*, 1922. He died Nov. 6, 1927.

Hogarth, William (1697-1764). English painter, engraver, and moralist. Belonging to a Westmorland family, he was born in Bartholomew Close, London, Nov. 10, 1697. He began his career as apprentice to a silversmith in Leicester Fields, but amused himself with painting, and paid some attention to engraving. His master set him to engrave visiting cards, shop bills, and coats of arms, but he himself worked on illustrations for books, and soon produced six for King's History of the Hea-



Self-portrait in the National Gallery

then Gods. In 1726 he became known by some plates for Butler's *Hudibras*. Three years later, running away with the only daughter of the artist Sir James Thornhill, he settled in South Lambeth.

His well-known trip to the Isle of Sheppey took place in 1732. He was one of a party of four, and to the account of the journey and its adventures Hogarth supplied the illustrations. The MS. can still be seen in the British Museum. Then he removed to Leicester Fields, and began, with *The Harlot's Progress*, his long series of didactic chronicles in pictorial art. This group of works includes *The Rake's Progress*, *The Enraged Musician*, the wonderful series of *Marriage à la Mode*, *Beer Street* and *Gin Lane*, *Industry and Idleness*, *Four Stages of Cruelty*, and *The Election*.

His popular portraits and interiors belong to quite another order. They possess a charm of composition, colouring, and lively atmosphere entirely their own, which can never be too highly praised. They are works of the highest

artistic merit, as portraits unflinching, as works of decoration charming; indeed as a portrait painter, especially when those of Lord Lovat, Capt. Coram, the artist himself, and Garrick are considered, Hogarth has had few rivals. His composite portrait of his own servants and his famous *Shrimp Girl*, both in the National Gallery, London, rank among the world's most precious canvases. Equally does he stand alone in his extraordinary moral chronicles, vivid pictures of the evil side of English life of the day, social and domestic vices, attacked at their most vulnerable points by ridicule. He waged a strong crusade against criminality, corruption, hypocrisy, and extravagance, and perhaps a stronger against drunkenness and cruelty to animals.

Hogarth became serjeant painter to the king in 1757. In 1762 he allowed his satirical genius to take political form and the result was a savage portrait of Wilkes and a quarrel with his former friend. Hogarth was in the habit of spending all the summer at Chiswick and the winter at his house in Leicester Fields, where he died Oct. 26, 1764. He was buried at Chiswick.

Several of his best pictures are at the Soane Museum in Lincoln's Inn Fields; others are at S. Bartholomew's Hospital, the National Gallery, the National Portrait Gallery, Windsor Castle, and Lambeth Palace. The house in which he lived at Chiswick, built about 1700, was presented to the Middlesex county council in trust for the public. Hogarth's notes on the *Analysis of Beauty* were published in 1956 in an edition edited by J. Burke.

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Hogg, James (1770-1835). British poet, known as the Ettrick Shepherd. Born at Ettrick, Selkirkshire, the son of a shepherd, he received a scanty education, but at 16 a reading of *The Gentle Shepherd* by Allan Ramsay inspired him to write poetry. This leaning



James Hogg

was developed by his connexion with Scott, to whom he supplied some old ballads for his *Border Minstrelsy*. Hogg did not obtain any success until 1807, when a volume of poems entitled *The Mountain Bard*, and a practical treatise on the care of sheep, brought him in £300, which he lost in unprofitable farming.

The *Queen's Wake*, 1813, a series of ballads supposed to have been recited before Mary Queen of Scots at a competition of Scottish bards, was the first work to bring Hogg something more than a local reputation. It has real merit, with a strong vein of impressive if somewhat fantastic imagination. The latter half of Hogg's life was spent partly in Edinburgh and partly at Altrive in Yarrow on a farm of which the duke of Buccleuch gave him a life lease, and where he died Nov. 21, 1835. Hogg was a prolific writer both in verse and in prose. Among his best known poems are *The Poetic Mirror*, *Bonny Kilmeny*, and some fine lyrics such as *To the Skylark*, *When the Kye comes Hame*, and *Cam' ye by Atholl?* *Memorials of J. H.*, by M. G. Garden, appeared in 1903; a critical study by E. Batho, in 1927.

Hogg, Quintin (1845-1903). British philanthropist. The fourteenth child of Sir James Weir



Quintin Hogg,
British philanthropist
Elliott & Fry

Hogg, he was born in London, Feb. 14, 1845, educated at Eton, and became a merchant in the City. In 1882 he purchased the lease of the Royal Polytechnic Institution, Regent St., which he opened on Sept. 25 as a successor to an earlier Youths' Christian Institute, his object being to provide young men with instruction and recreation. Hogg died at the Polytechnic, Jan. 17, 1903. His *Life* was written by E. M. Hogg, 1904. A statue, originally outside the Polytechnic (q.v.), now stands in Portland Place, W.1.

Quintin Hogg's eldest son Douglas became lord chancellor and was created Viscount Hailsham; his grandson, the 2nd Viscount Hailsham, was in 1957 appointed chairman of the Conservative party. See Hailsham, 1st Viscount.

Hoggar or Ahagggar. High plateau region of the Sahara, lying S. of Algeria. The mountains,

though not exceeding 8,000 ft., are a barrier to a projected Trans-Sahara rly. To the N. lies Ain Salah, occupied by the French in 1899. See Sahara.

Hogland or Hoochland. Island of Finland. It is in the Gulf of Finland, about 20 m. S. of the Finnish coast, and was at one time joined to the mainland. It is known for a vibrating rock, which produces the sounds of an organ.

Hogmanay or Cake Day. Name used in Scotland and the N. of England for New Year's Eve, and the gifts then bestowed. Among hogmanay customs are the exchanging of presents between friends, the giving of oatcakes to children to the cry of "hogmanay," and the singing and acting of the guisers or masquers. In London, Scotsmen celebrate hogmanay night in S. Paul's Churchyard. Though first recorded in Scotland in the 17th century the word, variously spelt hogmena, hogmenay, hagman heigh, is probably of early French origin, and a corruption of O. Fr. *aguillanneuf*, explained as "to the mistletoe the new year" (*au qui l'an neuf*), a term of rejoicing derived from the Druids.



Quintin Hogg. Statue in Portland Place, London, erected by members of the Regent Street Polytechnic in memory of its founder

Hog Plum (*Spondias*). Genus of trees of the family Anacardiaceae, natives of the tropics of both hemispheres. The leaves are divided into long, opposite leaflets, and the flowers are small with four or five each of sepals and petals. The fleshy fruit is plum-like and contains four or five seeds. These fruits vary in



Hog Plum. Leaf, flowers, and fruit of *Spondias dulcis*

flavour, according to species; some, though palatable to natives, are not appreciated by strangers. *S. lutea*, native of the West Indies, is known as golden apple and Jamaica plum. *S. dulcis*, of the Society Islands, is the sweet Otaheite apple, with a pine-apple-like flavour. The unripe fruits of *S. mangifera* are used as a pickle in India.

Hog's Back. Western termination of the North Downs in Surrey, England. It is so called on account of its outline. It runs from Guildford to Farnham, about 10 m.; the height of the chalk elevation is from 350 to 500 ft., and its breadth at the top is about 500 yds. See Downs.

Hogshead. Old English measure of liquid capacity. In 1483 it was fixed at 63 wine galls., equal to 52½ imperial galls., but now it equals 54 galls. for beer, cider, etc. As a large cask, its capacity varies according to commodity and locality, as for molasses, sugar, or tobacco. See Weights and Measures.

Hog's Stomach. Extracts are used in cases of dyspepsia due to shortage of the normal secretions of gastric digestion. Also in pernicious anaemia, to replace the blood-making factor normally secreted by the stomach wall. See Anaemia.

Hohenberg, Sophie, Duchess or (1808-1914). Austrian princess. Born the Bohemian Countess Chotek, she married the Archduke Francis Ferdinand of Austria in 1900. The alliance was morganatic and their children, therefore, forfeited the right of succession to the Austro-Hungarian imperial throne. The duchess was driving with her husband when he was assassinated at Sarajevo, June 28, 1914, and she shared his fate.

Hohenfriedberg, Battle of. Prussian victory over the allied Austrians and Saxons in the War of the Austrian Succession on

June 3, 1745. Frederick the Great, whose army of 65,000 was opposed to the Allied forces of Prince Charles of Lorraine, 70,000 strong, had been watching the advance of his enemy upon Silesia, and had kept his army concealed. Seizing an opportunity of striking, during the night he manoeuvred his men and guns, and at daybreak opened a furious attack on the enemy left wing. After two hours of fighting the battle became general, and despite a stiff resistance on the part of the Austrians, an irresistible charge of the Baireuth dragoons finished the battle with the capture of 2,000 prisoners and 66 Austrian colours.

Hohenlinden, THE BATTLE OF. French victory over the Austrians, Dec. 3, 1800. The Austrian archduke John, in order to cut off the French army under Moreau, who had established himself N. of the Inn, resolved to cross the Lower Inn and seize Munich. Hampered by bad weather, the Austrians were advancing through the driving snow when Moreau launched an attack against them. Ney and Grouchy engaged the van, while Richepanse skilfully attacked the rear, and, thus caught between two shears, the Austrian defence gave way. They lost heavily, 10,000 casualties, and as many prisoners, together with a hundred guns. The French losses were little more than 5,000. Thomas Campbell has a poem on the event.

Hohenlohe. Former principality of Germany, consisting mainly of the Jagst Kreis of Württemberg. It lies to the E. of Heilbronn on the Bavarian frontier, and was mediatised in 1807. The family of Hohenlohe, which traces its descent from the 12th century, was divided in 1551 into two lines, Hohenlohe-Neuenstein, and Hohenlohe-Waldenburg, and has produced several soldiers and statesmen, two of whom are mentioned immediately below.

Hohenlohe - Ingelfingen, FRIEDRICH LUDWIG, PRINCE OF (1746-1818). Prussian general. Born at Ingelfingen, Württemberg, Jan. 31, 1746, he saw service against the Prussians during the Seven Years' War. After this he entered the Prussian army, rising to high command by 1794, when he beat the French at Kaiserslautern as a corps commander. In 1806, however, he was defeated by Napoleon at Jena (Oct. 14), and, despite personal gallantry, was forced to surrender at Prenzlau with 17,000 men on Oct. 28. Died near Kosel, Silesia, Feb. 15, 1818.

Hohenlohe - Schillingsfürst, CHLODWIG KARL VICTOR, PRINCE OF (1819-1901). German states-

man. Born at Rotenburg, on the Fulda, in Hesse, March 31, 1819, of the junior branch of the family, he entered the diplomatic service after some years as a Prussian civil servant. During 1866-70 he was Bavarian minister for foreign affairs and head of the government, in which latter capacity he played an important part in assisting Bismarck to bring about the union of N. and S. Germany. In 1874 he went as German ambassador to Paris, and was one of Germany's representatives at the Berlin congress of 1878. From 1885 he was governor of Alsace-Lorraine, leaving Strasbourg in 1894 to take the post of imperial chancellor. Most of his work as chancellor was done behind the scenes, but he was a continual supporter of Bismarck's policy, and remained the emperor's chief adviser until Oct., 1900. He died at Ragatz, Switzerland, July 6, 1901. The publication of his Memoirs in 1906 caused a sensation by their candour. See Berlin, Congress of; consult Memoirs, Eng. trans. G. W. Chrystal, 1906.

Hohenstaufen. Name of a famous German family, members of which were rulers of the medieval empire during 1138-1254. The name is taken from a hill near Lorsch, in Württemberg, on which the early Hohenstaufens had their castle, some remains of which are still in existence.

The family first became prominent in the 11th century, towards the end of which one of them was made duke of Swabia. This gave them an added importance in Germany, especially in the time when Henry V was emperor. Frederick and Conrad of Hohenstaufen were his nephews, and when he died, in 1125, Frederick, his heir, just failed to secure the throne. In 1127, however, Conrad was chosen German king, and in 1138 became the emperor Conrad III. Frederick I Barbarossa succeeded him in 1152, and then came Henry VI in 1190. After a period of decline the position of the Hohenstaufens was restored by Frederick II, but when his grandson Conradin was put to death in 1268 the male line



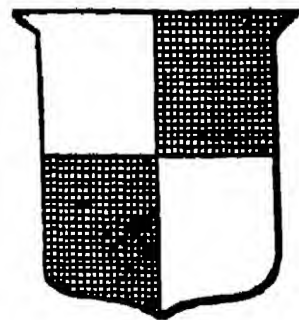
Prince Hohenlohe-Schillingsfürst, German statesman

became extinct. See Empire; Frederick I; Frederick II.

Hohenzollern. Name of the family that supplied kings to Prussia from 1701 to 1918 and German emperors from 1871 to 1918; also of a principality, later a Prussian prov., in S. Germany. The family was first heard of in S. Germany, its earliest members being nobles who called themselves counts of Zollern, the hill on which their castle stood. This is near Hechingen, about 30 m. S. of Stuttgart, and was known as Hohen or High Zollern. The castle, of which some ruins remain, is said to have been built in the 9th century, but the first authoritative mention of its counts is in the 11th. The existing castle on the hill was built by Frederick William IV (1795-1861).

Frederick was always a favourite name in this family, and in the 12th century two Fredericks, father and son, were very useful to the German kings of their time. A third Frederick increased the importance of the family by a marriage which made him in 1191 burgrave of Nuremberg.

In 1227 the family lands were divided, and two main branches of the Hohenzollerns came into existence. The elder kept Zollern and the lands there, and was known as the Swabian; the younger supplied burgraves to Nuremberg, and, as that city was in Franconia, was known as the



Hohenzollern province arms

Franconian. The Franconian Hohenzollerns were the more ambitious. One Frederick, burgrave of Nuremberg, obtained the principality of Baireuth, and in 1273 helped Rudolph of Hapsburg to secure the throne so long held by his descendants. His son, another Frederick, obtained Ansbach, and rendered invaluable service to Louis IV. A later Frederick was made a prince of the empire in 1363.

In 1415 the European importance of the Hohenzollerns began. Brandenburg was without a ruler, and the emperor Sigismund gave it to his friend, Frederick of Hohenzollern, who became its margrave and one of the seven electors. This shifted the power of the Hohenzollerns from S. to N. Germany, and henceforward they were identified closely with Brandenburg. Under their rule its area and wealth were increased, the most vigorous of them being perhaps

the great elector Frederick William, under whom it became a European power. In 1701 his son Frederick became king of Prussia, and this title superseded the earlier one. The family reached the summit of its greatness when William I was crowned German emperor in 1871. Ansbach and Baireuth served meanwhile as inheritances for younger sons until in 1791 they were sold to the king of Prussia.

All this time the Swabian Hohenzollerns continued to rule their lands in comparative obscurity. The emperor Charles V befriended them, and they soon formed the lines Hohenzollern-Hechingen and Hohenzollern-Sigmaringen. Both rulers were princes of the empire and maintained their little courts until 1849. Then they resigned their thrones and their territories became the property of the king of Prussia, according to an arrangement made in 1695. The land was formed into the co. or dist. of Hohenzollern, and was part of Prussia until 1945, when it was allotted to the French zone in Germany. These Swabian Hohenzollerns took their places as younger members of the house. One of them, Leopold, was suggested as king of Spain in 1870, and another, Charles, became king of Rumania in 1881. The revolution of 1918 reduced all the Hohenzollerns, except the king of Rumania, to the position of private individuals. See Germany; Prussia; consult My Ancestors, William II, Eng. trans. W. W. Zambra, 1929; The Hohenzollerns, H. Eulenberg, Eng. trans. M. Bozman, 1929.

Hohenzollern-Redoubt. Name given to an intricate trench fortress in the German first line at the battle of Loos, 1915. It lay about 4½ m. N. of the village of Loos, in the dept. of Pas-de-Calais. It was pear-shaped, with its broad end pointing N., and had a frontage of 500 yds. See Loos, Battle of.

Hohe Tauern. Range of mts. in the Austrian Tirol. It trends from W. to E., to the S. of Salzburg, between the Pinzgau and the Puster Thal. The highest peaks are the Gross Glockner (12,455 ft.) and the Gross Venediger (12,010 ft.). The range, which is continued W. by the Zillerthal Alps and E. by the Niedere Tauern, is crossed by no road, but the rly. from Salzburg to Carinthia passes it by a series of tunnels.

Hokchow. Seaport of Hainan Island, China. It is the port of Kiungchow, capital of the island, which lies off the S. coast. It owes its importance to the opening of

Kiungchow as one of the treaty ports of China. It formerly included foreign consulates and the customs station. The name means seaport.

Hokiang. Former province of Manchuria, China, absorbed in the province of Sunkiang, itself added to Heilungkiang in 1954. The name Hokiang means meeting of the rivers (Sungari, Ussuri, and Heilungkiang). It had 18 cos., with Kiamusze as the capital. The area is a low humid plain, thinly populated—less than 30 to the square mile—because of wide marshlands and difficulties in cultivation and drainage. The winter is extremely cold with long periods of heavy frost.

Hokitika. Borough and political capital of Westland, New Zealand. Situated on the Hokitika river, it has rly. connexion with Greymouth and Ross. Gold mining (sluicing and dredging), sawmilling, and farming are the chief support of town and district. Hokitika means direct return. The celebrated Franz Josef glacier, 95 m. S., the Fox glacier, Mahinapua lake and river, and Lake Kanieri are easily accessible, and the scenery surrounding the last is among the finest in New Zealand. Pop. (1951) 2,990.

Hokkaido. Name of the northern island of Japan, also called Yezo. It formerly included the Kurile Is., annexed by Russia, 1945. Hokkaido (without the Kuriles) has an area, with adjacent islands, of 30,000 sq. m., and is separated from Sakhalin (Karafuto) by Soya Strait, and from Honshu, the Japanese mainland, by Tsugaru Strait.

In general the shape of Hokkaido is due to the lie of the mountain ranges of the interior, for the land usually rises somewhat rapidly from the coast. The central block of mountains, with many peaks above a mile high, culminates in Wutakkamushpa (7,300 ft.); from it ridges radiate to N., W., and S.; W. of the W. and S. ridges lie the valleys of the two largest rivers, Teshio and Ishikari, with a coastal ridge beyond. W. and S. of Sapporo ridges form a backbone as far as Hakodate, the highest point being Makkarinupuri (6,500 ft.), a graceful treecad cone, with a crater 2 m. in circumference. Tarumae, E. of Makkarinupuri, is an active volcano, and the majority of the peaks are extinct craters; between Tarumae and Mororan is the hot spring and geyser district of Noboribetsu.

The main rly. line is from Hakodate to Nemuro through Otaru, Sapporo, and Asahigawa; there are branches to the coast at Iwanai, Mororan, Rumoi, Abashiri, and Soya Strait. Nemuro is the port for the Kuriles. Ferry services are maintained from Hakodate and Mororan to Aomori in Honshu; the main steamship service is from Otaru and Hakodate to Kobe. Sapporo, a new town laid out in 1869, is the capital, and Hakodate the chief port; Otaru and Mororan export coal. Mororan has a steel foundry, but fishing, lumbering, and mining are the principal industries.

Tsugaru Strait is a deep channel which separates the flora and fauna of Hokkaido from those of Honshu: the grizzly bear of Hokkaido is not found in Honshu, while the red pine of Honshu does not occur in Hokkaido. The climate is severe: winter is long, much snow falls and lies on the ground for six months, and the shores are icebound for a long period. There is little agriculture as the soil is unsuitable, but farming in a small way is carried on. Salmon is canned at Ishikari, and brewing is engaged in at Sapporo, where there are paper mills and glass works. The chief exports normally are canned salmon, dried fish roe, salt, sulphur, and fish oil. Pop. 2,000,000, including about 20,000 Ainu. See Japan.

Hokusai, KATSUSHUKA (1760-1849). Japanese painter. Born at Yedo, Oct. 21, 1760, he studied under the elder Shonsho, whose popular style he closely followed at first. He is known as the creator of popular Japanese genre, landscapes, flower paintings, etc. His output was enormous, his *kakemonos* have been eagerly sought by Western connoisseurs, and his influence on Degas and Whistler was marked, though his own countrymen have never regarded him as an artist of the first rank. He died at Yoddo, May 10, 1849.

Holbach, PAUL HEINRICH DIETRICH, BARON D' (1723-89). French materialist philosopher. Born at Hildesheim in the Palatinate, he was brought up in Paris. Here he gathered round him distinguished men and philosophers—d'Alembert, Holvôtius, Diderot, Grimm, Buffon, Hume, Sterne, Rousseau. His ideal was entire political and religious liberty. His *System of Nature*, the bible of materialism, published under the pseudonym of Mirabaud, disturbed by its outspoken-

ness even Frederick the Great and Voltaire, and terrified Goethe. According to Holbach, mind and matter, morality and natural philosophy, are identical; matter and movement, its inseparable companion, alone exist. All religions are equally harmful and unnecessary. Holbach died in Paris, Jan. 21, 1789. *Pron.* Olbak.

Holbeach. Market town in Lincolnshire, England, and agricultural centre noted for potatoes, flowers, and bulbs. It is 8 m. by railway E. of Spalding. All Saints' Church is a fine example of Late Decorated. On Holbeach Fen extensive traces of Romano-British occupation have been studied by air photography and excavation. Holbeach Marsh, between the town and the Wash, has been reclaimed from the sea by successive enclosures. Market day, Thurs. Pop. 6,112.

Holbein, HANS (c. 1460-1524). German painter. Born probably at Augsburg, a tanner's son, he was influenced by, and possibly studied under, Martin Schongauer at Colmar. Until 1514 his home was Augsburg, but he was at Ulm in 1499 and Frankfort in 1501, and died at Issenheim. He painted some altar-pieces and panels for churches in Central and S. Ger-

Holbein, HANS (c. 1497-1543). German painter and engraver. Born at Augsburg, he was the son of Hans Holbein the elder, and brother of Ambrose and Sigmund Holbein, also painters, the former specially known as a designer for work in wood engraving. When the home at Augsburg was broken up in 1514, Hans went to Basel, where he employed himself in preparing designs for title pages and illustrations for the great printing firms. His earliest surviving painting, representing the Virgin and Child, was executed in the same year. In 1517 he carried out some wall decoration at Lucerne, but was back again in Basel in 1521, to which year belongs his decoration of the Rathaus. His two greatest religious pictures, each of them representing the Madonna and Child, belong to 1522 and 1526. The former is at Solothurn; the latter, now at Darmstadt, is one of his grandest compositions.



Hans Holbein,
German painter
After a self-portrait

for whom at once he became principal painter. To this same period belongs the portion of the cartoon for the decoration of the Palace of Whitehall, now preserved as one of the principal treasures of the duke of Devonshire. Holbein's great portrait of Christina, duchess of Milan, now in the National Gallery, was painted in 1538, and soon after its completion he was back for the last time in Basel. In 1539 he was sent abroad to paint the portrait of Anne of Cleves. Returning again to England, he resided in the parish of S. Andrew Undershaft, London, where, according to his will, discovered in 1861, he died, probably of the plague, about Oct., 1543.

Holbein was a marvellous draughtsman, and his designs for woodcuts, and for decoration, and for objects to be executed by the goldsmith, are of the greatest possible beauty. In portraiture, he excels in simplicity and in accuracy. The famous series of portrait drawings preserved at Windsor Castle, and representing the chief persons connected with the court of Henry VIII, are unequalled for the extraordinary simplicity with which they present fidelity to character. They are perhaps the simplest and most truthful portraits ever executed, and done with a rigid economy of line.

Holbein was perhaps the first man in England to paint what are now known as portrait miniatures, and the few which can be definitely attributed to him are marked by subtle delineation of character and exquisite draughtsmanship. His greatest paintings in England are those in the National Gallery, at Windsor Castle, Longford Castle, and Lambeth Palace, but some noble work can be seen at The Hague, in Berlin, Vienna, Paris, Munich, and Basel. His most notable miniatures were collected by the queen of Holland, the duke of Buccleuch, and J. P. Morgan of New York. *See* Anne Boleyn illus.; Anne of Cleves illus.; Berners, 2nd Baron illus.; Dance of Death illus.; Drawing illus.; Elyot, Sir T. illus.; Painting.

Bibliography. Life and Works, R. N. Wornum, 1867; Holbein, H. Knackfuss, 1899; H. H. the Younger, G. S. Davies, 1903; A. B. Chamberlain, 1913. *Consult also* the works of E. Law on the Paintings at Hampton Court Palace; Hanfstängel's reproductions of the Windsor Castle Studies.

Holbein, MONTAGUE A. (1861-1944). British cyclist and swimmer. In 1882 he rode 100 m. on a safety bicycle in 5 hrs. 54 mins.



Hokusai. An illustration by the Japanese artist to a romance, drawn about 1795

many, and several of his religious compositions are at Augsburg. He was called the elder to distinguish him from his son (*v.i.*).

period was that of Thomas Cromwell, and it was probably the then Master of the Jewel House who presented Holbein to Henry VIII,

2 secs.; in 1890 he covered 177½ m. in 12 hrs. In 1892 he accomplished 337 m. on a tricycle in 24 hrs. He became equally famous as a long distance swimmer, principally in connexion with his nine unsuccessful attempts to swim the Channel during 1903-11. Holbein died July 11, 1944.

Holberg, **BARON LUDVIG AF** (1684-1754). Danish writer. Born at Bergen, Norway, Dec. 3, 1684,



Ludwig Holberg,
Danish writer

he was educated there and at Copenhagen University. He travelled widely in Germany, the Dutch Republic, and Scandinavia, and during 1706-07 was at Oxford, where he supported himself by teaching music. On returning to Copenhagen he was made an honorary professor, but set out travelling again, visiting Paris and Rome. He came back in 1716 and two years later became professor of metaphysics, and, in 1720, of public eloquence.

In 1719 a new chapter of his varied life opened with the publication of the famous mock-heroic poem, *Peder Paars*, a brilliant satire on the pedantries and conventions of his day, and he went on to devote his energies to the drama. He directed the newly founded Danish theatre at Copenhagen, 1722-27, producing in rapid succession a number of comedies.

The third phase of Holberg's life was spent in writing historical, biographical, and philosophical works, marked by their good style no less than by the extraordinary versatility of their author. In recognition of his invaluable services to Danish vernacular literature, of which he is generally counted as the founder, French and Latin being used before, he was created baron in 1747. His activity continued almost to his death, Jan. 28, 1754. Grieg, who greatly admired Holberg, named a suite after him.

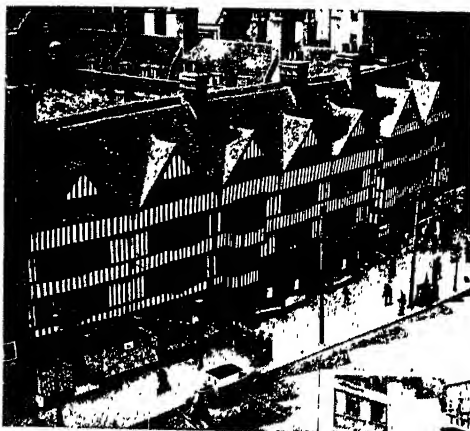
Holborn. Metropolitan borough of London. It extends from Tot-

tenham Court Road on the W. to Farringdon Road on the E. and lies in the main north of New Oxford St. and High Holborn. It covers 405 acres, and is well served above and below ground by London Transport. Near Staple Inn are Holborn Bars, indicating the W. boundary at this point of the City of London. High Holborn was part of the old way over which those going to execution at Tyburn were taken from the Tower and Newgate. The Holebourne, the name of part of the river Fleet, gave its name to Holborn.

Within the borough are the British and Sir John Soane Museums; the Senate House, and some of the constituent bodies of the University of London; Gray's Inn, Lincoln's Inn, Staple Inn, and the site of Furnival's Inn;



Holborn borough
arms



Holborn. Tudor houses in High Holborn; they screen Staple Inn

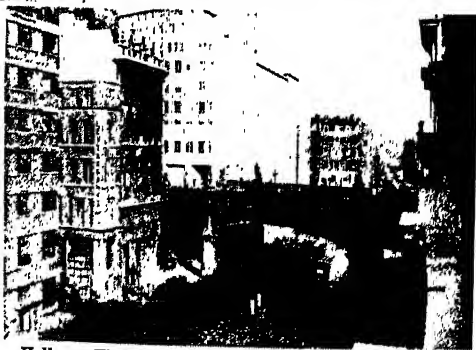
the churches of S. Alban, 1862, S. Giles-in-the-Fields, 1731-33, S. George, Bloomsbury 1720, and the 14th-century chapel of S. Etheldreda — all that remains of the ancient palace of the bishops of Ely; the palace gardens are covered by Hatton Garden, a diamond mart. In the borough are Bedford, Bloomsbury, Russell, Queen, Red Lion, and Woburn Squares, and Lincoln's Inn Fields. Handsome council buildings in High Holborn

replaced in 1908 the former town hall in Gray's Inn Road. A great number of buildings suffered from bombing, blast, or fire during the German air raids of 1940-44, when over 300 bombs and 2,500 incendiaries fell on Holborn.

Holborn had as its first mayor in 1900 the 11th duke of Bedford. It is part of the bor. constituency called Holborn and St. Pancras S. Pop. (1951) 24,810.

Holborn Viaduct. Structure in the City of London, 1,400 ft. long and 80 ft. wide, including an iron bridge of 107 ft. It was constructed 1867-69 to carry the roadway over the valley of the Holeybourne, part of the Fleet (*q.v.*).

Holbrooke, **JOSEF CHARLES** (b. 1878). British composer. Born at Croydon, July 5, 1878, he studied at the Royal Academy of Music, and obtained engagements as a conductor and concert pianist, but composition was his primary interest. His tone-poem, *The Raven*, after Poe, performed at the Crystal Palace in 1900, arrested attention; other tone-poems for chorus and orchestra followed: *Queen Mab*, *Uralume*, *The Bells*, *Apollo* and the *Seaman*. A two-act opera, *Pierrot and Pierrette*, was given in 1909. Then came the Wagner-like trilogy *The Cauldron of Anwyn*, to a libretto by Lord Howard de Walden; of its three parts *The Children of Don* was first performed 1912; *Dylan* 1914; extracts of *Bronwen* have been played. Holbrooke wrote eight symphonies, eight concertos, including one for saxophone and bassoon, variations on popular tunes, operas, chamber music, and works for band. His work, con-



Holborn Viaduct. Structure in the City of London spanning Farringdon Street. It was built 1867-69

ceived on a heroic scale, uses an unorthodox orchestra.

Holcroft, **THOMAS** (1745-1809). English dramatist and novelist. He was born in Leicester Fields, London, Dec. 10, 1745, the son of a shoemaker and jobmaster.

After a chequered early life, at one period of which he had a situation in the household of Granville Sharp, he became connected with the stage, and his first novel, *Alwyn, or the Gentleman Comedian*, 1780, embodies many of his own experiences. In the following year appeared his first play, *Duplicity*. He wrote four novels in all, and wrote, translated, or adapted some thirty plays. The most notable of the latter is *The Road to Ruin*, 1792. He died in London, March 23, 1809.



Thomas Holcroft,
English dramatist

Holda. Goddess of Teutonic mythology. Represented as benignant and merciful, she is a familiar figure in German popular legends and nursery tales. She is regarded as a being of the sky, and when it snows is making her bed so that the feathers fly. She drives in a wagon, and is the goddess of spinning, agriculture, and household order.

Holden, CHARLES (b. 1875). British architect. Born in Bolton, May 12, 1875, he became known as



Charles Holden,
British architect

a designer of commercial and public buildings in a style appropriate to 20th century town planning. Among his earlier works were the war memorials at New College,

Oxford, and Clifton College, and designs for the Imperial War Graves Commission, 1918-22. His outstanding works include the Royal Infirmary, Bristol; King's College of Household and Social Science, Kensington; Piccadilly Circus underground station; the headquarters of London Transport at Westminster, for which he received the R.I.B.A. architecture medal in 1929; and the new buildings of London university, 1931. He was a member of the Royal Fine Arts Commission 1933-47. He was appointed town planning consultant for Canterbury in 1943, and for the City of London in 1945; the L.C.C. also named him chief architect for the development of the S. bank of the Thames.

Holden, SIR ISAAC (1807-97). British manufacturer. Born at Hurlet, near Paisley, May 7, 1807,

son of a miner who had migrated from Cumberland, he became a teacher in Paisley in 1823, and later in Leeds. His connexion with the woollen trade began in 1830, when he secured an appointment as bookkeeper to a firm at Cullingworth, Yorks. He invented a wool-combing machine, which proved the foundation of his fortune. He was joined by Samuel Lister, afterwards Lord Masham, but after a few years each developed his own business. Holden founded the firm of Isaac Holden & Sons, a wool-combing concern at Bradford with a factory in France. In 1865 he was elected Liberal M.P. for Knaresborough, for which place he sat until 1868. During 1882-85 he was M.P. for the W. Riding, and during 1885-95 for Keighley. He was made a baronet in 1893, and died Aug. 13, 1897. His son, Sir Angus Holden, was made Baron Holden of Alston, 1908.

Holder. In banking, any person in possession of a bill who holds it either as payee, indorsee, or bearer. (*See Bill of Exchange.*)

Generally, the word is used for any contrivance in which something is held or secured. In engineering, the adjustable clamp for holding the armature brushes of dynamos and motors is called a holder, and many other clamps in electrical work are known by the term. Either of the two loops attached to the reins for holding a pulling horse is a holder.

Hölderlin, JOHANN CHRISTIAN FRIEDRICH (1770-1843). German poet. Born at Lauffen on the Neckar, March 20, 1770, he studied theology at Tübingen, but under Schiller's influence abandoned it for philosophy. He developed a pantheistic worship of nature and an intense admiration of the ancient Greeks. In 1798 he had a violent, though blameless, love affair with the wife of a banker named Gontard, in whose house at Frankfurt-on-Main he was as a tutor; he moved to Homburg, but the incident affected him profoundly. Nevertheless this was his greatest creative period: the romance *Hyperion*, in prose-poetry of extreme beauty, and most of his lyrics, mainly in classical forms, date from it.

In 1801 he went as a tutor to Bordeaux, but a mental breakdown forced him to return. By 1804 he had sufficiently recovered to take a librarian's post in Homburg; two years later, however, he was placed in an asylum, from which he was discharged in 1808 as incurable. Silent and uncrea-

tive, he lived in the house of a Tübingen carpenter until his death, June 7, 1843.

His work includes many translations from the Greek; his *Lyric Poems* were issued in 1826, and a collected edition of his works, with letters and a life, in 1846. His popularity grew steadily, reaching a climax in the 1920s; his work has had a strong influence on German poets, notably Nietzsche. *Consult* biography by A. Stansfield, 1945; Hölderlin's *Madness*, I. Gascoyne, 1946.

Holderness. Wapentake of the E. Riding of Yorkshire, England. In the extreme S.E. of the co., N. of the Humber, and terminating in Spurn Head, it contains the towns of Beverley, Hedon, Hornsea, and Patrington. It elected one member of parliament until 1950, when it became part of the co. constituency of Bridlington.

Holding. Term used in Great Britain in the Agricultural Holdings Acts. It signifies a farm, or land with or without buildings, principally used for agriculture or market gardening. *See Agricultural Holdings Acts.*

Holding Company. A coy. 'with one or more subsidiary coys., i.e. coys. in which it holds more than 50 p.c. of the equity share capital or controls the composition of the boards of directors while holding at least one share. If a subsidiary coy. has itself subsidiaries, its holding coy. is a holding coy. of these also. Holding coys. are occasionally established when there is association of concerns in similar or complementary lines of business; the original coys. join for practical purposes and each issues to the holding coy. all its shares, the latter distributing to the original holders its own shares.

Holding over. Term of English law. It means keeping possession of land by a tenant after his tenancy has legally expired. If the holding over is with the consent of the landlord, express or implied, the tenant becomes a tenant at will. Payment and acceptance by the landlord of rent will usually amount to consent. Where in the original tenancy the rent was expressed on a yearly basis, the effect of holding over will be to create a yearly tenancy. *See Landlord.*

Holdsworth, SIR WILLIAM SEARLE (1871-1944). British lawyer. Born at Elmers End, Kent, May 7, 1871, he went to Dulwich College and New College, Oxford. After a year at the Inns of Court, he returned to Oxford and was a

fellow of S. John's College from 1898 until in 1922 he was appointed Vinerian professor in English law. He was made K.C. in 1920, a bencher of Lincoln's Inn in 1924, a knight in 1929, and received the O.M. a year before his death on Jan. 2, 1944. A great scholar and teacher, Holdsworth devoted most of his career to his masterpiece, *History of English Law*, which appeared in 12 vols., 1903-38. His *Essays in Law and History*, ed. A. L. Goodhart and H. G. Hanbury, appeared in 1947.

Hole, SAMUEL REYNOLDS (1819-1904). A British divine. Born at Ardwick, Lanes, Dec. 5, 1819, he

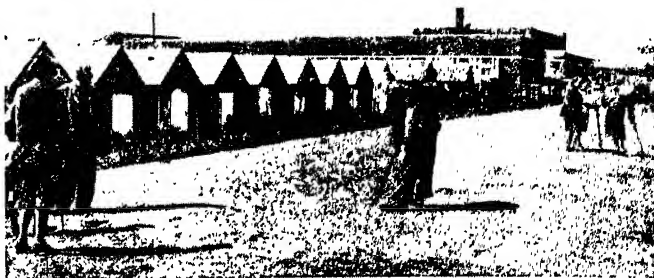


Samuel R. Hole,
British divine
Elitott & Fry

was the son of a brewer, who was also the squire of Cauntton, near Newark. From Newark grammar school Hole went to Brasenose College, Oxford. Ordained in 1844 he became curate and then vicar of Cauntton. In 1887 he accepted the deanery of Rochester, where he died Aug. 27, 1904. Hole was a fine example of the muscular Christian and sporting parson. He was intimate with John Leech and others of the Punch circle. He had also a high reputation as a rose grower, and his most popular book is *A Book about Roses*, 1869. His *Memories*, 1892, and *More Memories*, 1894, are full of good stories.

Holguin. Second largest city of Cuba. It lies 65 m. N. by W. of Santiago and 15 m. N. by W. of Gibara, its port, with which there is rly. connexion. Corn, timber, tobacco, and cattle are exported, sugar is grown in the district, and the city is a centre of agricultural and cattle trading. Founded 1720, granted civic rights 1751, it has grown enormously in the 20th century. Pop. (1953) 228,644.

Holiday Camp. The basis of the holiday camp, in the sense now generally accepted, is the old-established private practice of "camping-out" in tent or caravan for recreation or pleasure, i.e. the camping holiday. Cadet corps, as well as such bodies as the Boys' Brigade and the Boy Scouts, helped to popularise among young people the notion of a corporate camp; and many holiday camps for poor children were also organized by charitable institutions early in the 20th century. Schools, too, tended increasingly to favour the idea.



Holiday Camp. These camps can accommodate upwards of 5,000 visitors. This view, at Filey, Yorks, shows the chalets in which campers are housed

Many thousands of schoolchildren camped annually at Stratford-on-Avon. Small holiday camps existed as commercial ventures even before the First Great War, e.g. at Scarborough and Douglas, though usually these were for men only. The communal family camp on a large scale was developed commercially in Great Britain by William Butlin (*q.v.*). His first camp was established at Skegness in 1936, with accommodation for 5,500 campers, housed in chalets. Sport, entertainment, and other amenities were organized on a group basis. The venture was a success, and by 1939 other large camps were built or under construction at Clacton, Filey, and in N. Wales. Their popularity showed no sign of diminution after the Second Great War. During that war the camps afforded accommodation for naval, army, and R.A.F. training and holding depôts.

Holidays with Pay. The Holidays with Pay Act, 1938, is intended to benefit employees in industries where they are not sufficiently well organized to make with their employers collective arrangements for holidays. Under that Act and the Wages Councils Act, 1945, in any industry for which a wages council has been established by the minister of Labour, that council may recommend that workers be allowed holidays with pay; the duration to be related to the period for which the worker has been employed. There are similar provisions for the catering industry in the Catering Wages Act, 1943; and for agriculture and the road haulage industry.

Holinshed, RAPHAEL (c. 1520-80). English chronicler. He was employed in 1560 as translator by Reginald Wolfe, printer to Queen Elizabeth. Wolfe planned a universal cosmography, and when he died Holinshed became responsible for the modified form in which it

appeared (in two folio vols.), in 1577, as *The Chronicles of England, Scotland, and Ireland*. Holinshed had as assistants William Harrison, Richard Stanyhurst, and others. A second edition, in three folio volumes, appeared in 1587, and there was a reprint in six vols., 1807-08. The work, familiarly known as *Holinshed's Chronicles*, was used by Shakespeare for his historical plays. Consult Shakespeare's *Holinshed*, W. G. Boswell Stone, 1907.

Holism (Gr. *holos*, whole). The philosophy which regards nature as consisting of wholes. Natural objects, animate and inanimate, are to be considered not simply as assemblies of component parts, but as bodies representing something more than the mere sum of their elements, and which cannot be synthesised by the mechanical process of assembly. The mechanistic view of orthodox scientists assigns to mind an inferior position which the holists cannot accept; they differ in believing, firstly, that matter, life, and mind do not necessarily consist of constant elements, and secondly, that an object as a whole possesses characteristics apart from those contributed by its various component parts.

Holism embraces physics, biology, psychology, and metaphysics. It is put forward as an alternative to a science whose basis has been shaken by recent physical and mathematical discoveries, and further as a solution to the problems of creative evolution. The origins of holism are traceable from Hans Driesch's *Philosophy of Organism*, 1908. J. C. Smuts is a leading protagonist, and his *Holism and Evolution*, 1926, is a standard work. See *Philosophy, Modern*; consult also *Mechanism, Life, and Personality*, J. S. Haldane, 1921; *Life, Mind, and Spirit*, Lloyd Morgan, 1926.

Holkham Hall. Seat of the earl of Leicester in Norfolk. It is a great 18th century Palladian house built of white brick. Kent was the architect, and it was erected by Thomas Coke, 1st earl of Leicester. It contains some fine rooms, especially the picture gallery. The estate was bought in 1659 by John Coke, a son of the lawyer, Sir Edward Coke. It is famous in the history of

towns, and the village churches are notable. It forms a co. constituency called Holland with Boston. Area, 420 sq. m. Pop. (1951) 101,545.

Holland. Name of part of the Kingdom of the Netherlands, often used in the U.K. for the whole country. Meaning woodland, first used 1064, it was given to a county that arose out of the ruins of the Carolingian empire

Holland and Zeeland passed with the rest of the Burgundian lands to Mary, the daughter of Charles the Bold, and then to her son Philip, a member of the Hapsburg family. Philip's successor was his son, Charles V, and then came Philip II of Spain. Against Philip, the whole of the Netherlands, led by Holland, rebelled. Holland and Zeeland were united more closely and round them was formed, in 1579, the union of Utrecht by the seven provinces that threw off the sovereignty of Spain and were later recognized by Europe as the Dutch republic. The title count of Holland was borne by William the Silent.

Holland, NORTH. Prov. of the Netherlands. It embraces the flat, low-lying country between the North Sea and the Ysselmeer (remains of the former Zuider Zee), and marches S. with Utrecht and S. Holland. Large tracts lie over 10 ft. below sea level, protected by the dunes on the W. coast and by dykes, *e.g.* the Helder dyke. The capital is Haarlem (*q.v.*), but Amsterdam is the largest town, others of note being Helder, Hilversum, Alkmaar, Enkhuizen. The prov. is traversed by the Noord Holland and Noord Zee canals and by lesser waterways. The Purmer, Beemster, and Wieringermeer are *polders*, or reclaimed marshes. The Wieringermeer, reclaimed from the Zuider Zee, 1930, was flooded by the Germans, 1945, and again reclaimed. Agriculture, especially cattle-rearing, is the chief industry. Area, 1,081 sq. m. Pop. (1954) 1,950,244.

Holland, SOUTH. Province of the Netherlands. Adjoining N. Holland, Utrecht, and Gelderland, it includes the islands of the Rhine-Maas delta. The prov. has The Hague as capital, other important towns being Rotterdam, Dordrecht, Leyden, Delft, Gouda, and Schiedam. The various branches of the lower Rhine, the Waal, Yssel, Lek, and Oude Rijn, flow through the prov., forming with the numerous canals a maze of waterways. The country is well cultivated. Area, 1,166 sq. m. Pop. (1954) 2,537,647.

Holland. A city of Michigan, U.S.A., in Ottawa co. Situated on Macatawa Bay, an arm of Lake Michigan, it is 26 m. S.W. of Grand Rapids. It is served by rly. and steamer, and has flour-mills, tanneries, and a great variety of manufactures. In summer, it is the commercial centre of the lake resorts,



Holkham Hall, Norfolk. The seat of the earl of Leicester seen from the park

agriculture because here Coke's nephew and successor, the earl well known as Coke of Norfolk, carried out his experiments, which immensely increased the rental of his estate. The village, which has an old church with a lofty tower, is on the coast, 2 m. W. of Wells. It was once a port and market town. *Pron.* Ho-kum.

Holl, FRANCIS MONTAGUE (1845-88). British painter. Son of Francis Holl, an engraver, he was born in London, July 4, 1845, and studied at the R.A. schools, beginning to exhibit in 1869. Subject pictures of contemporary life, rather sombre, at first occupied him, but in 1878 he exhibited a portrait of Cousins, the engraver. During his popularity as a portrait-painter his sitters included the duke of Cambridge, Lord Wolseley, Bright, Gladstone, and Joseph Chamberlain. Elected R.A. 1884, Holl died July 31, 1888.

Holland. Linen fabric used as material for dresses, aprons, blinds, etc. The name Holland cloth was originally given to linen made or bleached in Holland. Formerly holland was of very fine texture; in 1745 Defoe, inveighing against the extravagance of the times, includes holland among articles "requiring the regulation of a sumptuary law."

Holland, THE PARTS OF. Division of Lincolnshire, England, having for some purposes its own county council. The smallest and S.E. division of Lincs, it is chiefly fenland. Through Holland the Witham and Welland flow into the Wash. Boston, Crowland, Holbeach, and Spalding are the

and was included in the Holy Roman Empire.

This county had its own rulers from about 920, though it was not until nearly two centuries later that they were called counts of Holland. Many of them were named Dirk, others Floris, and like their contemporaries they passed their time mainly in fighting. In general they were successful; the result being that, from a small arearound Dordrecht, Holland grew to include all land between the Texel and the Maas.

In 1299 the male line of the counts became extinct, and the county passed to John, a descendant in the female line. He was also count of Hainault, and from his time that county was united with Holland. His son William was recognized as ruler also of the district around Amsterdam and part of Zeeland, the earlier counts having disputed the lordship of these possessions with the counts of Flanders or the bishops of Utrecht. In 1345 the county line again became extinct; eventually the county was secured by William, a Bavarian prince.

In the 14th century the land was troubled by civil war between the so-called Hooks and Cods, into which Edward III of England, whose wife had claims on Holland, was drawn. William's brother, Albert, ruled well for many years and then came the latter's son, who, dying in 1417, left an only child, Jacqueline. Ringed by foes, she struggled hard to preserve her inheritance, but in the end ceded Holland and Zeeland to Philip the Good of Burgundy.

receiving many tourists. Holland was settled by the Dutch in 1847, and chartered twenty years later. Pop. (1950) 15,858.

Holland, HENRY FOX, 1st BARON (1705-74). British politician. The younger son of Sir Stephen Fox, he was born at Chiswick, Sept. 28, 1705. Educated at Eton, he entered parliament in 1735 for Hindon, Wilts, becoming a follower of Walpole. In 1746 he was appointed secretary at war.



1st Baron Holland,
British politician
After Reynolds

He joined Pitt in attacking certain members of Newcastle's ministry, of which, however, he remained a member, and he was one of the group who controlled, by cynical arrangements among themselves, the affairs of state about this time. In 1755 Fox became secretary of state and the principal colleague of Newcastle, but in 1757 he retired and was made paymaster-general. In 1762 he was again leader of the house of commons as he had been under Newcastle, but in 1763 Bute got rid of him. He was then made a baron. He bought Holland House (q.v.), Kensington, and died there July 1, 1774.

Holland, HENRY RICHARD VASSALL FOX, 3RD BARON (1773-1840). British politician. Son of the 2nd baron, he was born at Winterslow, Wilts, Nov. 21, 1773, and was educated at Eton and Christ Church, Oxford. In 1774 he succeeded to the title and, influenced by his



3rd Baron Holland,
British politician
After C. Leslie, R.A.

uncle, Charles James Fox, began his career as a Whig politician. In 1806 he entered the cabinet as lord privy seal, but retired on the fall of the government in 1807. He served the Whig cause during the years of Tory rule, and in 1830, when the Whigs triumphed, was made chancellor of the duchy of Lancaster. He held that post, with two short intervals, until his death, at Holland House, Oct. 22, 1840.

Holland married in 1797 Elizabeth Vassall (1770-1845), divorced wife of Sir Godfrey Webster. They made Holland House a great social

centre. Lord Holland wrote *Memoirs of the Whig Party*, 1852. Lady Holland died Nov. 16, 1845, and in 1908 appeared her *Journal*, edited by the earl of Ilchester.

Holland, SIR HENRY (1788-1873). British physician. Born at Knutsford, Oct. 27, 1788, he was related to Mrs. Gaskell and Charles Darwin. He was educated at private schools and, after a time passed in business in Liverpool, went to Edinburgh to study medicine. Then he graduated, and in 1816 began to practise in London. He became physician to Queen Victoria, was made F.R.S., and in 1853 a baronet. A great traveller, he wrote *Travels in the Ionian Islands, Albania, Thessaly, and Greece*, 1815. He died Oct. 27, 1873. He married a daughter of Sydney Smith, and his eldest son became Viscount Knutsford (q.v.). Consult his *Medical Notes and Reflections*, 1840; and *Recollections of Past Life*, 1872.

Holland, HENRY SCOTT (1847-1918). British divine. Born near Ledbury, Jan. 17, 1847, he was educated at Eton and Balliol College, Oxford, afterwards becoming a tutor of Christ Church for 12 years. Greatly influenced by Liddon, Holland was ordained in 1872 and soon became known as a powerful preacher, especially after 1884, when he was appointed canon of St. Paul's. He remained there until made regius professor of divinity at Oxford in 1910. Holland was an advanced Liberal in politics. He wrote a *Life of Jenny Lind*, 1909, and *A Bundle of Memories*, 1915. He died at Oxford, March 17, 1918.



H. Scott Holland,
British divine
Elliott & Fry

Holland, JOHN PHILIP (1841-1914). American inventor. Born at Lisconnor, co. Clare, Ireland, he was a schoolmaster at Limerick

until he emigrated to the U.S.A. He was teaching in New Jersey when the American Civil War broke out, and the naval action between the Merrimac and the Monitor turned his attention to the possibilities of a submersible warship. Although his first experimental boat in 1875 was a failure, he pro-

duced at last in 1898 a serviceable submarine, with a 50-h.p. petrol engine for surface cruising and electric storage batteries for underwater propulsion. It was commissioned by the U.S. navy, and the British Admiralty acquired all the patents for Great Britain. The inventor died at Newark, N.J., Aug. 12, 1914.

Holland, SIR THOMAS ERSKINE (1835-1926). British jurist. Born July 17, 1835, son of a Sussex clergyman, he was educated at Brighton College and Balliol College, Oxford. He became a barrister in 1863, and soon made a reputation as a student of jurisprudence. In 1874 he was appointed Vinerian reader in English law at Oxford and professor of international law and diplomacy. He held the post until 1910. Knighted in 1917, he was a fellow of the British Academy. Holland's great work is *The Elements of Jurisprudence*, which appeared in 1880. He also wrote *Studies in International Law*, 1894; *The Laws of War on Land*, 1904. He died May 24, 1926.

Holland, SIR THOMAS HENRY (1868-1947). An English geologist. Born at Helston, Nov. 22, 1868, he entered the Indian civil service in 1890, to become president of the mining and geological institute of India in 1906. He directed the geological survey of the country from 1903 until in 1909 he returned to England as professor of geology and mineralogy at Manchester. Knighted in 1908, Sir Thomas was rector of the Imperial College of Science and Technology, 1922-29, then 15 years principal and vice-chancellor of Edinburgh university. He was vice-president of the Royal Society, 1924-45. He died May 15, 1947.

Holland House. Historic London mansion. It stood in its own grounds, Holland Park, between Kensington High St. and Holland Park Avenue in the bor. of Kensington. It was a notable example of Jacobean architecture, and, when Macaulay wrote his



Holland House, London. Seen from the garden before it was damaged by bombs in 1940

essay on Addison, 1843, could "boast of a greater number of inmates distinguished in political and literary history than any other private dwelling in England." The centre building and turrets, 1607, were built by John Thorpe for Sir Walter Cope. The house, known as Cope Castle, was extended for the 1st earl of Holland, husband of Cope's daughter.

Here died Joseph Addison three years after his marriage to the widow of the 3rd earl of Warwick and Holland. The house was bought by Henry Fox, created Baron Holland in 1763, and on the death of Lady Holland, widow of the 4th baron, in 1889, the property passed by purchase to the earl of Ilchester, a descendant of Henry Fox's brother. In the time of the 3rd Lord Holland and his brilliant if imperious wife Holland House became a social *salon* and headquarters of the Whigs. A statue of the 3rd Lord Holland by Watts is in the grounds facing Kensington High St. In Holland Park in 1804 Lord Camelford was mortally wounded in a duel with Col. Best.

The house, reduced to a shell by fire from incendiary bombs in 1940, contained valuable pictures and relics. House and grounds were purchased by the L.C.C. in 1951; the grounds were opened to the public in 1952, and the foundation stone of a youth hostel (to hold 200) was laid in 1957.

Holland Park. Name of a dist. between Holland Park Avenue and Kensington High St., London, W., and of the adjacent tube station, taken from the park containing Holland House. At No. 12 (N. side), Holland Park Road, just N. of Kensington High St., is Leighton House, long the residence of Lord Leighton; it was presented to the borough council by his sisters as a centre for the promotion of the arts. Plans to rebuild in this dist. the Imperial Institute (to be moved from S. Kensington to make room for an extension of the Imperial College of Science) were announced in 1957.

Hollands. Variety of gin, sometimes called Schiedam or Schnapps. It is manufactured near Schiedam, S. Holland, the Netherlands.

Hollands(ch)e Diep. Arm of the Maas estuary, Netherlands. It runs between the S. coast of South Holland and the coast of N. Brabant to the E. of Willemstad. It is in effect a continuation of the Haringvliet and Kramer-Volkrak arms, and runs up towards the delta of

the Biesbosch (*q.v.*). Its entrance is defended by two shore forts.

Hollar, WENCESLAUS (1607–77). A Bohemian engraver. Born at Prague, July 13, 1607, he studied



Wenceslaus Hollar,
Bohemian engraver
From a print

under Merian at Frankfort, publishing his first plates in 1625. By the earl of Arundel, English ambassador to Germany, he was brought to England in 1637 and appointed drawing master to the prince of Wales (afterwards Charles II); and at the outbreak of the Rebellion fought for the royalists. He afterwards escaped to Antwerp, but returned in 1652, and in 1660 was made draughtsman to the king. After the Great Fire of 1666 he engraved a map of London, leaving the burnt portions blank. Loss of employment, with extravagance, made him poor. He died bankrupt, March 28, 1677.

His views of towns include those of Oxford, Cambridge, Hull, Richmond, Greenwich, old and new London. He also showed in engravings, 1640–44, the dress of women of all classes in Europe. The British Museum has a fine collection of Hollar prints. See Becket illus.

Holles, DENZIL HOLLES, 1ST BARON (1599–1680). English politician. A younger son of John Holles, 1st earl of Clare, he was born Oct. 31, 1599, and educated at court with Prince Charles, afterwards Charles I. In 1624 he entered the house of commons. In March, 1629, being then M.P. for Dorchester, he was one of those who held the Speaker down in the chair while he asked members to approve of the resolutions of protest to the king. For this he was imprisoned and fined, but made his escape abroad. He opposed the collection of ship money, and was a member of parliament when it was called together again in 1640. Holles had a hand in most of the great events that preceded the Civil War. He was one of the Five Members (*q.v.*) whose attempted arrest precipitated the outbreak.



1st Baron Holles,
English politician

Holles raised a regiment and fought at Edgehill and Brentford, but he was not very desirous of pressing the appeal to arms. He is next found as the chief opponent of Cromwell and the army, for which he was impeached, fleeing to France. He sat in parliament in 1659, and went to The Hague to invite the king to return. In 1661 he was made a peer. From 1663 to 1666 he was ambassador in Paris; in 1667 he arranged with Holland the treaty of Breda. Later he took up an attitude of opposition to Charles II, acting with Shaftesbury. He died Feb. 17, 1680. The title became extinct when his grandson, the 3rd baron, died in 1694, and the family is now represented by the duke of Newcastle (*q.v.*).

Hollingshead, JOHN (1827–1904). A British journalist and theatrical manager. Born in Hoxton, London, Sept. 9, 1827, he had a brief experience of business and began to contribute to Household Words. He was a voluminous writer for many years, and assisted many public movements with his pen, such as that for the better government of London, and the agitation for copyright reform. After three years as stage director of the Alhambra, where he introduced much-needed reforms, in 1868 he became manager of the Gaiety Theatre, where he had many successes in the drama. He died Oct. 10, 1904.

Hollins, ALFRED (1865–1942). British blind musician. Born Sept. 11, 1865, in Hull, he studied piano and organ at the Royal Normal College for the Blind, and later under Hans von Bülow. He first publicly appeared at 13, at the Crystal Palace, and subsequently toured the U.S.A. with a quartet of blind musicians. Later he appeared with leading American orchestras. Organist at S. George's West Church, Edinburgh, Hollins composed organ and piano music and songs, and wrote *A Blind Musician Looks Back*, 1936. He died May 17, 1942.

Holloway. Name of two wards, Upper and Lower Holloway, in the met. bor. of Islington, London. The district includes the Royal Northern Hospital, founded in York Road (later York Way) in 1856, moved to Holloway Road 1888, rebuilt there 1892–94, and later enlarged; the Pentonville prison, 1840–42; the Northern Polytechnic, opened 1896; and two famous taverns, the Brecknock Arms, at the junction of Camden and Brecknock Roads, and the Nag's Head, at



Holloway. Entrance to the Women's prison in Camden Road, sometimes called Holloway Castle

Holloway Road corner of Seven Sisters Road.

Holloway prison, a castellated structure built 1849-52, has accommodation for 1,000 women prisoners, mostly serving short sentences. Suffragettes before the First Great War were imprisoned here and, going on hunger strike, were subjected to forcible feeding. In 1945 Dr. Charity Taylor was appointed first woman governor of the prison.

Upper Holloway Baptist Chapel, long associated with the ministry of the Rev. J. R. Wood, was built in 1866. Islington's first public library was opened in 1906 in Manor Gardens, and the Central Library in Lower Holloway in 1907. The Piccadilly line station is called Holloway Road.

Holloway, THOMAS (1800-83). British patent medicine maker. Born at Devonport, Sept. 22, 1800,



Thomas Holloway, patent medicine maker

the son of a baker, he came to London in 1828, and nine years later concocted an ointment and a pill which he advertised very extensively. His success was largely due to the fearlessness with which he spent money on advertising. He acquired a handsome fortune, and, on Lord Shaftesbury's advice, founded a sanatorium, which was opened at Virginia Water in 1885. He also founded the Royal Holloway College for women (v.i.), and formed a picture gallery on which he spent more than £83,000. He died at Tittenhurst, Berks, Dec. 26, 1883.

Holloway College, ROYAL. College of the university of London in arts and science, at Englefield Green, Surrey. Founded and endowed as a college for women students by Thomas Holloway, and opened by Queen Victoria in

1886, it has residential accommodation for 300 students, who are prepared for the first and higher degrees of the university. The main building, with 800 rooms, is in the style of the French Renaissance, and possesses an interesting collection of pictures, including examples of Constable, Gainsborough, Morland, and Millais. It is surrounded by grounds containing science laboratories, a botany garden, swimming bath, and playing fields.

Holly (A.S. *holen*, *holeym*). Hardy evergreen tree of the family Aquifoliaceae, and genus *Ilex*. *Ilex aquifolium* is a native of Great Britain, but foreign species were introduced from N. America as far back as 1726. The leaves are usually spiny and dark green, though there are smooth and variegated sorts, and the red or yellow berries are borne in winter. Hollies should be planted in late spring and early autumn, while the soil is still warm. Any ordinary soil is suitable, provided the young plants are put in deeply so that the roots are adequately protected against frost. Holly makes one of the best hedges, but it is of slow growth, and needs constant clipping to keep it within bounds. To propagate, take the berries when ripe, just before Christmas, burying them in sand for twelve months,



Holly. Leaves and berries of *Ilex aquifolium*. Top, leaves and berries of the British species

1886, it has residential accommodation for 300 students, who are prepared for the first and higher degrees of the university. The main building, with 800 rooms, is in the style of the French Renaissance, and possesses an interesting collection of pictures, including examples of Constable, Gainsborough, Morland, and Millais. It is surrounded by grounds containing science laboratories, a botany garden, swimming bath, and playing fields.

and then planting them in the open, transplanting the young trees three years afterwards. *I. paraguayensis*, which yields maté, or Paraguay tea, needs greenhouse treatment, in loam and sand.



Hollyhock, leaves and flowers; bottom, right, the "cheese" containing seeds, and a single seed

in a temperature averaging 55° in Jan. or Feb., planting out in May for summer flowering. If left undisturbed for three or four seasons they may produce self-sown plants, both single and double.

Hollywood. Suburb of Los Angeles, California, U.S.A. It is regarded as the headquarters of the American film industry, though now virtually all the leading film personalities live outside it and only three major studios are here. Lying 8 m. W. of the centre of Los Angeles and 12 m. from the Pacific, it has the Hollywood Hills to the N., the Los Angeles river to the E., and the residential community of Beverly Hills to the W. With a semi-tropical climate, it presents a garish spectacle of stucco bungalows, streets lined with palm and pepper trees, restaurants built in the form of castles, fish, and ice-cream cornets, and strollers in the flamboyant slacks and smoked glasses affected by both sexes in the film industry.

The site of a single adobe house in 1853, Hollywood became a

160-acre fruit farm, and was incorporated as a village in 1903. The first Hollywood film, *The Law of the Range*, was made by the Nestor Company in 1911. Other companies followed, attracted by the climate and low rents; and today it has three of the industry's largest studios, the others being in Burbank, Culver City, and other neighbouring communities. Here are the Hollywood Bowl, a 60-acre natural amphitheatre with seats for 20,000 and standing room for 10,000 more; the Hollywood Legion stadium; the Japanese Gardens, with 30,000 trees; a Buddhist temple; and Grauman's Chinese Theatre, where Hollywood stars leave their footprints in cement. Allied industries, such as the manufacture of celluloid, films, and cosmetics, have grown up beside the main business. Pop. 184,531.

Holman, JAMES (1786-1857). A British traveller. The son of a chemist, he was born at Exeter, Oct. 15, 1786, served in the navy, 1798-1810, and had reached the rank of lieutenant when he became totally blind. A man of remarkable strength of will, he studied at Edinburgh university, and in 1812 was made a naval knight of Windsor. Obtaining leave to travel, he visited France, Italy, Savoy, Switzerland, Germany, and Holland, 1819-21; Russia, Siberia, where he was arrested as a spy, Poland, Austria, Saxony, Prussia, and Hanover, 1822-24; made a voyage round the world, 1827-32; and then travelled in Spain, Portugal, S.E. Europe, Syria, and Turkey. He published three accounts of his wanderings, before he died in London, July 29, 1857.

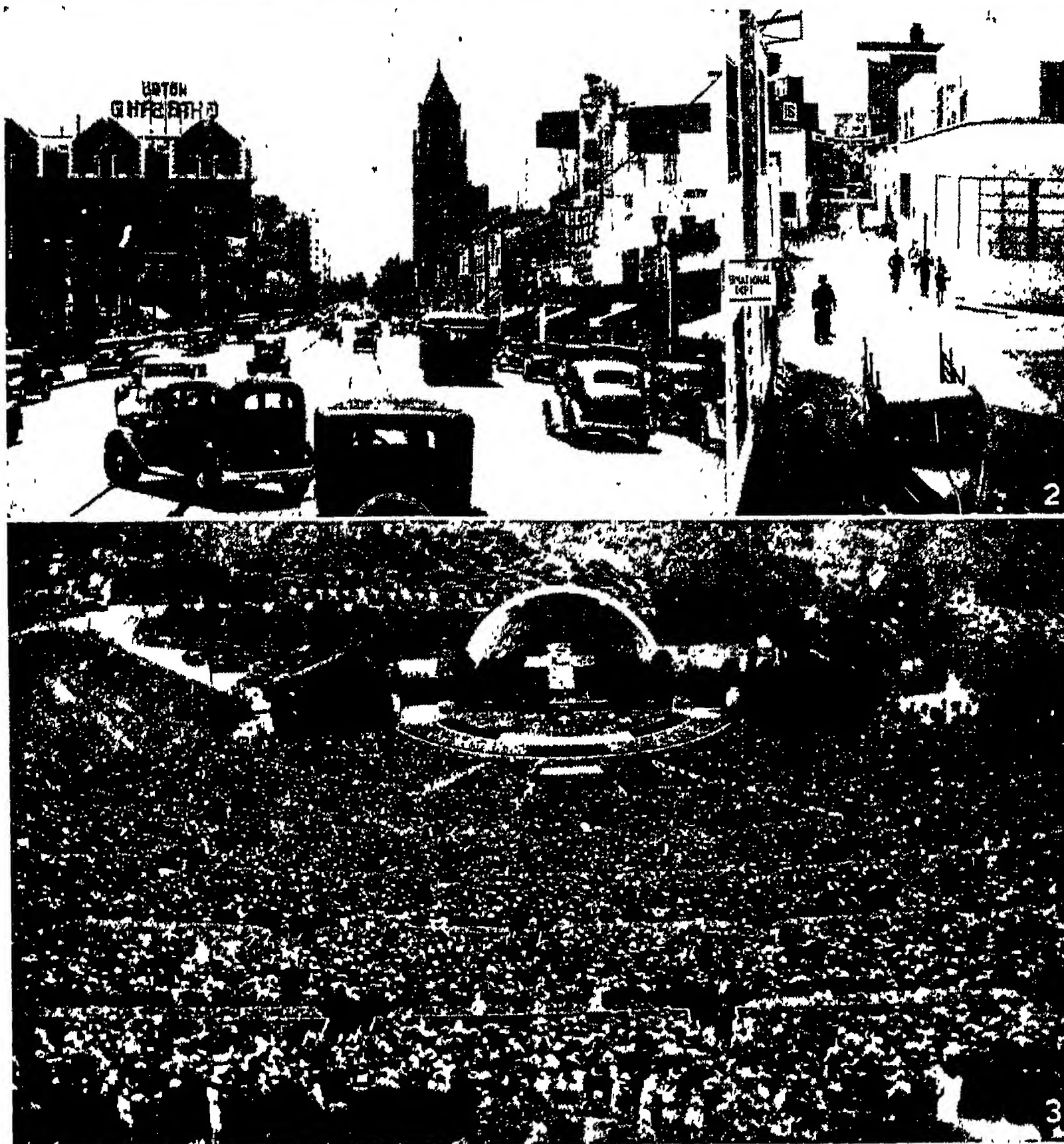
Holman, JOSEPH GEORGE (1764-1817). British actor and dramatist. The son of an army officer, he was born in Aug., 1764, and educated at Queen's College, Oxford. He made a highly successful debut at Covent Garden, Oct. 25, 1784, as Romeo. After three seasons he severed his connexion with Covent Garden and went to Dublin and Edinburgh. In 1812 he left England for the U.S.A., where he met with great success. He died at Long Island, Aug. 24, 1817. A rival of John Kemble, he won appreciation from Lamb and Macready, his successes including *Hamlet* and *Colonel Townley*. His plays belong to the school of Holcroft, and are now negligible.

Holmby House. Name of a Northamptonshire mansion. The existing Holmby (or Holdenby) House, about 7 m. N.W. of Northampton, was built in the 19th cent., its predecessor being one of the great 16th cent. domestic palaces.

Here James I is said to have stayed, and Charles I was forcibly detained in 1647 after his surrender to the Scots at Newark. Holmby House boasted a larger frontage even than Blenheim Palace and Castle Howard, its main façade measuring no less than 360 ft. The only remains of the original building are two archways and part of the N. side of the second quadrangle.

Holme Cultram. A village and parish (Holme Abbey) of Cumberland, England. It stands on the Waver, 5 m. N.W. of Wigton. The church of S. Mary occupies the site of a 12th-century Cistercian abbey, and was restored in 1885. Among the monuments is the tomb of Robert Bruce, father of the Scottish king of that name. Farming implements are manufactured.

Holme Lacy. Parish and village of Herefordshire, England. It stands on the Wye, 5 m. by railway S.E. of Hereford. Holme



Hollywood. Scenes in the unique "film city" of California. 1. Hollywood Boulevard. 2. A street between the studios. 3. An Easter sunrise service in the Hollywood Bowl, attended by 30,000 people. Choir members wearing white surplices form a cross in the centre. Fanfares on trumpets and the releasing of thousands of doves mark the moment of sunrise

Lacy House, formerly the seat of the Scudamores and more recently of the earl of Chesterfield, is a fine 17th cent. building containing a splendid collection of pictures and some excellent wood-carvings by Grinling Gibbons. In the Norman church, dedicated to S. Cuthbert, are noteworthy monuments of the Scudamore family. Pop. 250.

Holmes, SIR CHARLES JOHN (1868-1936). British art critic and painter. Born at Stratton, Cornwall, Nov. 11, 1868, he was educated at Eton and Oxford and studied at the Slade school. He was Slade professor at Oxford, 1904-10; director and secretary of the National Portrait Gallery, 1909-16; director of the National Gallery, 1916-28; knighted 1921, and made K.C.V.O., 1928. A member of the New English art club, he was the first to paint industrial Britain, and his water colours of canals, factories, and pitheads of the Midlands set a new fashion in simplicity of design and colour. Holmes wrote in 1898 an appreciation of Hokusai, the Japanese master; also monographs on Constable and Rembrandt. He died Dec. 7, 1936. There are examples of his art at the Tate Gallery, the Ashmolean Museum, and at Manchester and Johannesburg.

Holmes, OLIVER WENDELL (1809-94). American essayist and poet. Born at Cambridge, Mass., Aug. 29, 1809, he was the son of a Unitarian minister. Educated at Andover and Harvard, he began to study law, but turned to medicine and completed his studies in Paris, 1833-35. He started in practice in Boston, 1836, the year in which he published his first volume of poems. Having been physician at the Massachusetts General Hospital and lectured on anatomy and physiology, 1838-40, he became professor in those subjects at Harvard, 1847-52. A paper in 1843 on the contagiousness of puerperal fever won him some renown. In 1840 he married, and in 1849 gave up practice and apart from professorial work devoted himself to literature.

It was by *The Autocrat of the Breakfast Table*, 1858, that he established his position as an essayist of a new type working on the borderland of fiction, and also strengthened his position as poet. This work had appeared serially during the preceding year in *The Atlantic Monthly*, where it was followed by the similar work, *The Professor at the Breakfast Table*, 1860. A dozen years later came *The Poet at the Breakfast Table*.

In this trilogy is included the best of Holmes's prose and poetry. Wit and humour, fancy and poetry, are blent into a fascinating whole which is informed with a broad humanitarianism.

His novels, *Elsie Venner*, 1861, *The Guardian Angel*, 1867, and *A Mortal Antipathy*, 1885, occupy a subsidiary position; they present interesting pathological and psychological problems in a suggestive and impressive manner, but the discursiveness of the essayist was ill-suited to the form of the novel. Holmes also wrote biographies of Motley and Emerson. His work, especially the *Breakfast Table* series, and some of the poems such as *The Wonderful One Horse*



Oliver Wendell Holmes

After A. Schöff, 1897

Shay, *The Chambered Nautilus*, *Dorothy Q.*, and *Grandmother's Story of Bunker-Hill Battle*, became as popular in England as in America, and when in 1886 he paid a second visit to Europe he had in England something of an ovation, and recorded his experiences in *Our Hundred Days in Europe*, 1887. In *Over the Tea-cups*, 1890, he sought to revive the spirit of *The Autocrat* with, for an octogenarian, remarkable success. He died Oct. 7, 1894. Collected works, 13 vols., appeared in 1891; *Lives*, W. Jerrold, 1893; *L. W. Townsend*, 1909.

Holmes, OLIVER WENDELL (1841-1935). American jurist, son of the above. He was born in Boston, March 6, 1841, and after graduating at Harvard served in the Civil War. In 1867 he was admitted to the Massachusetts bar. He gained a high reputation by his editorship of the *American Law Review*, 1870-73. In 1882 he became a judge of the supreme court of Massachusetts: from 1899

chief justice, he was translated in 1902 to the supreme court of the U.S.A. Retiring 1932, he died in Washington on March 6, 1935. Holmes exercised a profound influence on legal thought, bringing a spirit of liberalism into the interpretation of the U.S. constitution.

Holmes, SIR ROBERT (1622-92). English sailor. He served in the royalist army during the Civil War, and on the Restoration, 1660, was given a command in the navy. He took part in the battle of Lowestoft, and distinguished himself against the Dutch, whose East Indian fleet he burned at Vliet, off Holland, in an action known as Robert Holmes's bonfire. In 1667 he was promoted admiral, and in 1669 was M.P. for Winchester and appointed governor of the Isle of Wight. In 1672, on the renewal of war with Holland, he commanded a squadron and fought in the battle of Sole Bay. He died Nov. 18, 1692.

Holmes, SHERLOCK. Central character of 60 stories by Sir A. Conan Doyle, first presented in the novel *A Study in Scarlet*, 1887. The subsequent full-length stories were *The Sign of Four*, 1889; *The Hound of the Baskervilles*, 1902; and *The Valley of Fear*, 1915. The 56 short stories were collected in five other volumes: *The Adventures of S. H.*, 1891; *The Memoirs of S. H.*, 1893; *The Return of S. H.*, 1904; *His Last Bow*, 1918; and *The Case-Book of S. H.*, 1927. All stories, short and long, except the first two named, appeared originally in *The Strand Magazine*, in which the illustrations by Sidney Paget helped to establish the popular conception of the figure. As early as 1893 the author had already tired of Holmes, and in the final story of *The Memoirs* described his dramatic death while ridding the world of an arch-criminal, Professor Moriarty; but in deference to public demand the detective was resuscitated some years later and remained alive almost as long as his creator. Holmes is an amateur detective of extraordinary astuteness in the solution of criminal mysteries by a process of scientific deduction, and is still regarded as the classic detective of fiction. His austere and fascinating personality is so consistently described in the course of the stories, which range in period from the early 1880s to 1914, that he gives the illusion of having been a real person. Many admirers have sought his consulting rooms at "221B, Baker Street," and during the festival of Britain, 1951, his

sitting room was "reconstructed" on the conjectured site at Abbey House (it was afterwards taken on tour in the U.S.A.). Plays and films have been based on his adventures; and his companion, Dr. Watson, narrator of the adventures, is almost as famous. *Consult My Dear Holmes*, Gavin Brenn, 1951.

Holmes, THOMAS (1846-1918). British criminologist. Born at Pelsall, near Walsall, the son of an ironmoulder, he taught in a night school for some years, and in 1885 was appointed police-court missionary at Lambeth police court, being transferred in 1889 to the N. London court. In this capacity he became a leading authority on criminology. He died March 26, 1918. Holmes's publications included *Pictures and Problems from London Police Courts*, 1900; *Known to the Police*, 1908; *London's Underworld*, 1912.

Holmfirth. Urban district and town of the W. Riding of Yorkshire, England. It is 6 m. S. of Huddersfield, with its own railway station. In 1938 the urban district was extended to include Honley, Holme, and New Mill. Woollens are manufactured and stone is quarried. The bursting of Bilberry reservoir in 1852 caused 80 deaths; in 1944 a cloudburst killed three people and caused damage est. at £300,000. Market day, Tues. Pop. (1951) 19,073.

Holmium. A rare earth metal occurring in gadolinite and other minerals. It is a trivalent element, symbol Ho, with yellowish salts and forms a chloride, HoU_3 , an oxide Ho_2O_3 , and other salts. The element has not yet been prepared in the free state. The atomic weight is 163.5.

Holm Oak (*Quercus ilex*). Evergreen tree of the family Fagaceae, a native of S. Europe and N. Africa. The leathery leaves, which last for

two years, vary in form from oblong to lance-shaped and may be toothed or not. The underside is whitish with a downy covering. The long, slender acorns ripen in their second year. Holm is a corruption of middle Eng. *holin*, holly, whose leaves those of the holm oak resemble in their texture.

Holocene (Gr. *holos*, whole; *kainos*, recent). Geological period which forms the top of the Kainozoic era. The most recent in the time scale, it continues to the present day. The boundary between the Holocene and the next older period, the Pleistocene, has been fixed at the date when the retreating Scandinavian ice-sheet had melted to such an extent that it became subdivided into two separate sheets at Ragunda—about 10,000 years ago.

Holocene deposits consist largely of river alluvium, scree, gravels, peat, sand dunes, salt-marsh beds, etc. The Fenland area in England is of this age. Submerged forests, e.g. near Rhyl, and the peat deposits found on the Dogger Bank probably belong to this period. Man's most rapid development has been during the Holocene, which includes the Mesolithic and Neolithic cultures. The end of the Palaeolithic cultures is considered contemporaneous with the close of the Pleistocene.

During this period the melting of the great Pleistocene ice sheets removed a heavy load off N. Europe, Asia, and N. America. Scandinavia and the Baltic area, where the ice was very thick, are rising steadily; in the centre of this area old shore lines have been elevated about 800 ft. In Scotland, the St. Lawrence estuary, and Labrador, evidence of recent uplift can also be seen. Canada, N. of the Great Lakes, is slowly tilting S.; if this continues the drainage from Lake Michigan may be diverted into the Mississippi. England, too, is tilting S.E., at a measurable rate. The sinking of the S.E. counties is between 1 and 2 ft. per century. Mountain building, which reached maximum intensity during the earlier Tertiary times, continues in the Netherlands E. Indies. Faulting in W. America has been observed, by earthquakes and also by actual displacements of the present-day land surface. Despite its relatively short duration this period has seen remarkable earth movements.

Gilbert Wilson, Ph.D.

HolocrySTALLINE. Term used to describe the texture of an igneous rock composed entirely of

individual minerals or interlocking crystals to the exclusion of any volcanic glass. Holocrystalline rocks have usually cooled slowly so that there has been time for complete crystallisation of the constituents.

Holofernes. Personage mentioned in the apocryphal book of Judith as the chief captain of the army of Nebuchadnezzar. The Hebrew maiden Judith saved her people by slaying him before the walls of Jerusalem.

Holograph (Gr. *holos*, whole; *graphein*, to write). A deed, will, or other document wholly written by the person making and signing it. This is one of the methods by which a deed may be formally executed in Scotland.

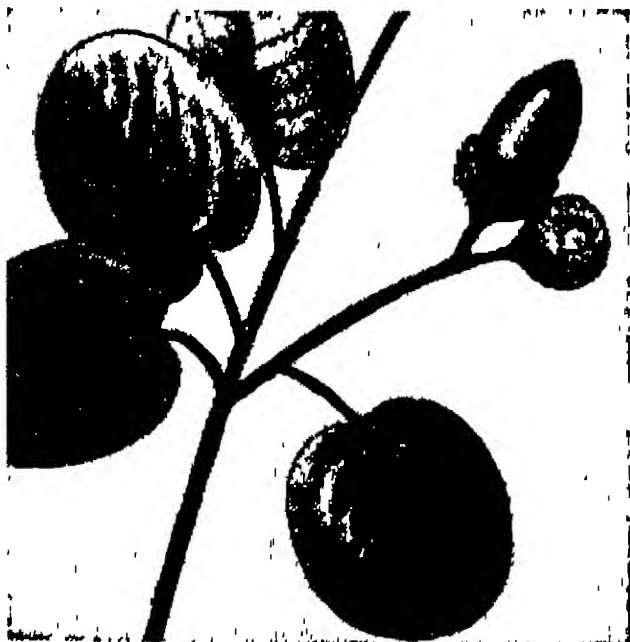
Holophytic. Biological term applied to organisms which synthesise their organic food from inorganic material absorbed in solution. The synthesis is normally dependent on sunlight, from which energy for the process is derived by chlorophyll.

Holothurian (Gr. *holothourion*). Order of echinoderms, commonly known as sea-cucumbers. They are all marine, and resemble large slugs or worms. The mouth is at one extremity, and in life is surrounded by plume-like tentacles. The skin is tough and leathery, and usually contains small chalky spicules. The length of the creatures ranges from 6 ft. to about an inch, and they vary greatly in form and appearance. Some can contract and elongate their bodies to a remarkable extent: others, when irritated, eject their internal organs in the form of a mass of sticky threads. There are numerous genera and species, many being found in the British seas; but most of the larger ones are natives of the tropics. Certain kinds, known as trepang or bêche de mer (*q.v.*), are valued as food by the Chinese.

Holotricha. Order of the class of protozoa called the ciliata. The animals in this order have similar cilia all over them, in contrast to the heterotricha.

Holozoic. A biological term applied to organisms which obtain their nourishment by taking in organic material in solid form and digesting it to obtain what they require.

Holroyd, SIR CHARLES (1861-1917). British artist. Born at Leeds, April 9, 1861, he studied art at the Slade School, and passed two years in Italy, afterwards becoming assistant to Prof. Alphonse Legros at the Slade. He was



Holm Oak. Leaves and acorn of this South European evergreen

known as an etcher of force and originality, much of his work appearing at the R.A. exhibitions. He was keeper of the Tate Gallery, 1899-1906, and director of the National Gallery, 1906-16. He wrote a *Life of Michael Angelo*, 1903. Knighted in 1903, he died at Weybridge, Nov. 17, 1917.

Holst, GUSTAV THEODORE (1874-1934). British composer. Of Swedish extraction, he was born Sept. 21, 1874, at Cheltenham, educated there, and studied at the Royal College of Music. Neuritis compelled him to abandon the organ for the trombone, which



Gustav Holst,
British composer

he played with the Scottish orchestra and at Covent Garden. From 1905 he was music master at S. Paul's girls' school; from 1919 he taught composition at the R.C.M., and was director of music at University College, Reading, 1919-23.

His compositions are outstanding for orchestral technique, and show the two diverse influences of English folk-song and of the East. In his so-called Sanskrit period, 1906-11, he wrote seven sets of Hymns from the Rig-Veda, the opera *Savitri*, to his own text, and *The Cloud Messenger*, for chorus and orchestra. *The Planets* suite for orchestra, 1915, was wholly English in its background. He followed these with the choral Hymn of Jesus, 1917 and *Ode to Death*, 1919; the operas *The Perfect Fool*, 1921, and *At the Boar's Head*, 1924, both to his own words; and a choral symphony, 1924. Other works include a fugal overture and fugal concerto, suites for strings and for military band, and part-songs. Holst's style is direct, forceful, and highly personal; a fondness for harmonic clashes and quintuple and septuple time contrasting with a gift for simple melody. He died May 25, 1934. His daughter Imogen, also a talented composer, wrote his *Life*, 1938.

Holstein. A former German duchy, then the S. part of the Prussian province of Schleswig-Holstein. It lay S. of the river Eider and the Kiel Canal, and included the former duchy of Lauenburg. Famous for its horse and cattle breeding, good grain in parts, and garden land, its largest

city was Kiel. There were textile, iron, cigar, foodstuffs, and ship-building industries.

About 800 the future duchy arose as a northern outpost of the Saxon tribes, which were subjugated by Charlemagne and split up into several countries. It fought neighbouring heathen Slavonic peoples (later the Danes) with alternating success and defeat, until its rulers became powerful, especially when, under Count Gerhard III the Great, Slesvig and later Denmark fell to the Holstein dynasty, 1304-26. Successors of several dynasties kept the duchies together, frequently in personal union with Denmark. One duke became the Tsar Peter III of Russia in 1762. With the end of the Holy Roman Empire in 1806 the duchies enjoyed a large degree of autonomy under the Danish crown and, from 1815, within the German Confederation. The struggle for or against their reunion with Germany is described under Slesvig-Holstein Question.

Holsworthy. Urban district and market town of Devon, England. It is 46 m. W. by N. of Exeter, with a rly. station. Agricultural trade is carried on. The Holsworthy and Bude Canal, constructed 1819-26 from near Holsworthy to Bude, is now abandoned, only two of its 33 m. being in use. The annual horse fair of S. Peter is held in July. Market day, Wed. Pop. (1951) 1,550.

Holt. Town and parish of Norfolk, England. Situated on rising ground a few miles inland, 10 m. W. of Cromer, it is the site of Gresham's school, founded 1554. Market day, Friday. Pop. (1951) parish, 1,945.

Holtby, WINIFRED (1898-1935). British author. She was educated at Scarborough and Somerville College, Oxford, and became a director of Time and Tide in 1926. Her first novel, *Andersby Wold*, was a sympathetic study of Yorkshire life. It was followed by *The Crowded Street*; *The Land of Green Ganges*; *Poor Caroline*, 1931; *Mandao* (short stories), 1934; her masterpiece, *South Riding*, published posthumously in 1936, was awarded the James Tait Black prize, and



Winifred Holtby,
British author

was later filmed. Other works included a critical study of Virginia Woolf, 1932; and a satire, *The Astonishing Island*, 1933. Winifred Holtby died after a long illness endured with remarkable courage, Sept. 29, 1935; her life is recounted in *Testament of Friendship*, V. Brittain, 1940.

Holt Line. British steamship company. It consists of the Ocean Steamship co. and the China

Mutual Steam Navigation co. The former was founded by Alfred Holt in 1865, and its first vessel went from Liverpool round the Cape to Singapore and China, but

this route was abandoned for the shorter one on the opening of the Suez Canal. The China Mutual co. was founded in 1882, and passed to Holt & co. in 1902.

The line runs a cargo service from Birkenhead to the Straits Settlements, China, and Japan, with extensions to the Philippines. Other services are from Birkenhead and Amsterdam to Indonesia, from Glasgow and Liverpool to Australia via Panama, and to the Straits Settlements and Indonesia via Suez; from New York to China and Japan. In 1915 the company purchased the Indra line of steamers plying between N. America and the Far East, and in 1917 four steamers owned by the Knight Steamship co. It is commonly known as the Blue Funnel Line. Its head offices are at India Buildings, Liverpool.

Hölty, LUDWIG (1748-76). German lyric poet. Born at Mariensee, Hanover, Dec. 21, 1748, he went to Göttingen university, where he became one of the founders and the most promising member of the circle of poets known as the Göttinger Dichterbund. His career was cut short by consumption two years after he left the university, and he died at Hanover, Sept. 1, 1776. His collected poems, 1782, contain many songs and odes of great beauty, but with a strain of tragic melancholy underlying them.

Holtzmann, HEINRICH JULIUS (1832-1910). German theologian. Born at Karlsruhe, May 17, 1832, he studied at Berlin and became professor at Heidelberg, 1861, and at Strasbourg, 1874. His chief fame was won as critic and commentator on the New Testament; his works including *Die Synoptischen Evan-*



Holt Line Flag.
Blue with white
diamond

gelien (The Synoptic Gospels), 1863; *Einleitung in das Neue Testament* (Introd. to the N.T.), 1885; and *Neutestamentliche Theologie* (N.T. Theology), 1897. He died Aug. 6, 1910.

Holy Alliance, THE. Treaty concluded at Paris in 1815, after the final abdication of Napoleon, by Alexander I, emperor of Russia, Francis II, emperor of Austria, and Frederick William III, king of Prussia. The three monarchs bound themselves in their relations with their subjects and with other powers to be guided by the principles of Christianity. The compact was really a recrudescence of the notion of divine right, and its political motive was to maintain the settlement made in Europe after Napoleon's fall. The treaty was subsequently subscribed to by all other European monarchs, except the Sultan, who was not asked, and the prince regent of Britain, who declined. Through the influence of Metternich, the Austrian diplomatist, the Holy Alliance degenerated into an instrument for resisting revolutionary tendencies, as when France interfered to check a movement towards constitutional reform in Spain in 1823. *See* Europe: History.

Holy Carpet. Popular name for the *kisweh*, or outer covering of



Holy Carpet. Scene during the procession of the carpet in Cairo, where it is made for the Ka'aba at Mecca

the Ka'aba, a building in the centre of the mosque at Mecca. It was formerly presented annually by the Sultan. Manufactured in Cairo, it is sent with the caravan of pilgrims to the holy city. It is of a coarse black brocade, covered with inscriptions from the Koran, etc., which are interwoven in silk of the same colour, and has a broad band across each side ornamented with inscriptions worked in gold. After having remained on the Ka'aba for nearly a year, the *kisweh* is taken off, cut into pieces, and sold

to the pilgrims. After 15 days the new covering is put up. *See* Ka'aba; Mecca; *consult also* Manners and Customs of the Modern Egyptians, E. W. Lane, 5th ed. 1860.

Holy Coat of Trèves. Relic, preserved in the cathedral at Trèves (Trier). It is alleged to be the seamless coat of Christ for which the soldiers cast lots at the Crucifixion, and to have been brought from Palestine by S. Helena when she discovered the Holy Cross. It is first mentioned in history in 1106, and soon afterwards was placed in a chest under the high altar, where it remained till about 1512, when the pope

sanctioned its exhibition once in seven years. The last occasion was in 1891, after an interval of 47 years, when a photograph taken revealed a curious negative impression of the face of Christ upon it. Numerous miracles are alleged to have been wrought through the relic, which now is only a fragmentary piece of linen.

Holy Cross. Summit of the Rocky Mountains in Colorado, U.S.A. Situated near the centre of the state, it derives its name from two snow-filled ravines intersecting at right angles and presenting a cruciform appearance. It is 14,170 ft. high.



Holy Cross, Colorado, showing the cruciform fissures which give the mountain its name



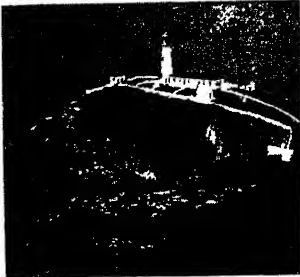
Holy Coat of Trèves. From a German lithograph issued in connexion with an exhibition of this relic at Trèves in 1891. The figure represents S. Helena

Holycross Abbey. Picturesque ruins of Cistercian abbey in Holycross, vill., co. Tipperary, Eire, 4 m. S.W. of Thurles. The abbey, near the river Suir, was founded in 1182 by Donnell O'Brien, king of Thomond, and owes its name to a supposed fragment of the true cross presented to his family and

now enshrined in the Ursuline Convent at Black Rock, near Cork.

Holy Ghost OR **SAINT ESPRIT**, ORDER OF THE. French order of knighthood. Founded by Henry III in 1575, it was last bestowed by Louis XVIII. The badge is a white cross pommée, with golden fleurs-de-lis in the angles. The ribbon is sky-blue watered silk. See *Holy Spirit*; *Knighthood*.

Holyhead. An urban dist., seaport, and market town of Anglesey, Wales. It stands on the N. side of Holyhead Is., a boat train terminus, and is the port of departure for British Railways steamers to Dublin. It has a fine harbour of refuge (begun in 1847 and opened in 1873), protected by a breakwater $1\frac{1}{2}$ m. long, and covering 267 acres. The old harbour has been considerably im-



Holyhead. The lighthouse which stands on the rocky coast of Holyhead Island, Anglesey

proved since the new one was completed. Market day, Sat. Pop. (1951) 10,569. Holyhead Mountain is an eminence of 720 ft.

Holyhead Island OR **HOLY ISLAND**, Island to the W. of Anglesey, Wales, connected with the county, to which it belongs, by an embankment over which the railway passes. It is 8 m. long, from $\frac{1}{2}$ m. to 3 m. broad, and has a generally barren surface. See *Anglesey*.

Holy Island OR **LINDISFARNE**, Island off the coast of Northumberland, England, about 2 m. from the mainland. This is an island only at certain states of the tide, and is reached from Beal village by cart or on foot across a sandy track, marked by beacons and refuge boxes. In the S.E. is a small fishing village, a popu-

lar summer resort, with golf links, and the harbour. S. Aidan founded a monastery here in 635, and S. Cuthbert was a bishop of the see. The monastery was destroyed towards the end of the 9th century, and a Benedictine priory church was erected on its site in 1093. There are ruins of this church and also of S. Mary's, built in 1130, both erected by the Normans, and a 16th century castle. The priory figures in Scott's metrical romance *Marmion*.

Holy Land. Name frequently given by Christians, Jews, and Mahomedans to Palestine, because of its religious associations.

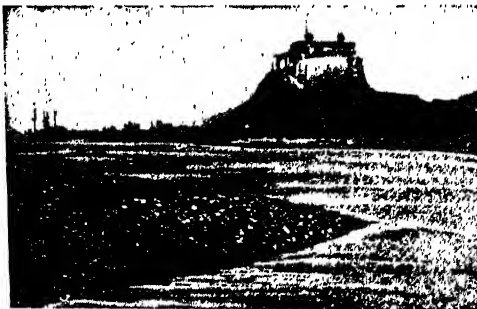
Holyoake, GEORGE JACOB (1817-1906). British pamphleteer. Born April 13, 1817, at Birmingham, he early identified himself with the Chartist movement and took part in the Bull Ring riots of 1839. In 1841 in Sheffield he kept a school and lectured on rationalism. While editing



G. J. Holyoake, British secularist
Elliott & Fry

The Oracle of Reason, he abjured Christianity, and was sentenced to six months' imprisonment for blasphemy. In 1846 he returned to London, where he published *The Reasoner* and in 1850 *The Leader*. His atheistical views had become modified when in 1854 he published *Secularism* (a word he coined), *The Practical Philosophy of the People*.

From his bookshop in Fleet Street Holyoake brought out pamphlets and books denouncing the Crimean War, and demanding the extension of the franchise and other social reforms. In 1876 he started *The Sectarian Review*. A leader of the cooperative movement, he wrote its history in 1875. He died Jan. 22, 1906, at Brighton.



Holy Island. The 16th century castle on this island off the Northumberland coast, also called Lindisfarne

Holy of Holies. Inner chamber of the Jewish Tabernacle (Ex. 26) and of Solomon's Temple (1 Kings 6). Alternative terms are the Most Holy Place and Presence Chamber of the Divine King. The Holy of Holies contained the Ark of the Covenant. See *Tabernacle*; *Temple*.

Holyoke. City of Massachusetts, U.S.A., in Hampden co. It stands on the Connecticut river, 8 m. N. of Springfield, and is served by rlys. The public library, the city hall, and several hospitals are the chief buildings. Holyoke is a busy industrial city, its factories obtaining power from a large dam across the river, which here descends 60 ft. Paper has long been an important product, and motor cars, bicycles, furniture, woollens, cottons, silk, machinery, bricks, wire, and screws are also manufactured. Mount Tom and Mount Holyoke are picturesque places in the neighbourhood. Before 1850, when it was incorporated, Holyoke formed part of West Springfield; it was chartered as a city, 1873. Pop. 53,750.

Holy Orders. Name given to the estate or degree of those who are admitted to the Christian ministry by the laying on of hands of a lawfully ordained bishop. As recognized in the Ordinal of the Church of England there are three grades of holy orders: bishops, priests, and deacons. In the Latin Church, which regards Holy Orders as sacramental, they include bishops, priests, deacons, and subdeacons, and the minor orders: acolytes, exorcists, readers, and door-keepers. Those in minor orders are persons set apart for work of a less spiritual character. The minor orders originated in the first half of the 3rd century. See *Apostolic Succession*; *Bishop*; *Deacon*; *Episcopacy*; *Ordination*; *Priest*; consult also *Orders and Unity*, C. Gore, 1910; *The Apostolic Ministry*, ed. K. E. Kirk, 1946.

Holy Places. Term applied since the Middle Ages to the places in and around Jerusalem with religious associations. To Christians, the chief are the Holy Sepulchre, Gethsemane, and the Mount of Olives; to Jews, the Wailing Wall; to Mahomedans, the Mosque of Omar. In 1230 Pope Gregory IX. appointed the Franciscans as custodians of holy places. Later, disputes between the Eastern and Western Churches over this matter were the immediate cause of the Crimean War, France and Russia both claiming the guardianship. See *Jerusalem*; *Sepulchre*.

Holy Roman Empire. This institution of medieval Europe is noted under Empire, Holy Roman.

Holy Rood (A.S. *rōd*, rod). Ancient name for the Holy Cross. Holy Cross Day (Sept. 14) is the dedication festival of the two churches built at Jerusalem by Constantine in 335. Introduced in the West in the 7th century, it celebrates the restoration of the relic of the Cross by Heraclius in 629, after it had been carried away by Chosroes, king of Persia. See Cross; Rood.

Holyrood. Name of abbey ruins and palace, Edinburgh, Scotland. The abbey was founded by David I in 1128, first on the Castle Rock, then on its present site, for

and of Mary and Darnley. Charles I was crowned; David II, James II, James V, and Darnley were buried here. To the abbey and its precincts until 1880 attached the privilege of sanctuary, first for civil and criminal offenders, and then for debtors.

The palace, built by James IV in 1498-1503, burnt by accident Nov. 13, 1650, restored by Cromwell, 1651-58, was rebuilt by Charles II, 1671-79. Prince Charles Edward held his balls and *levées* in the picture gallery, 1745-46, and here the lord high commissioner to the general assembly of the Church of Scotland holds his *levée* each May, and here also the Scottish representative peers

are elected for each new parliament. Holyrood has been the residence of British sovereigns visiting Edinburgh since the days of George IV. Features of interest are the apartments of Queen Mary,

Properly called the Church of the Resurrection, it was put up in the 4th century by Constantine the Great (*q.v.*). The tomb in which Christ is believed to have been buried consists of a cave 140 ft. N.W. of the hill of Calvary. The natural rock was cut away and the cave isolated; over it was erected a circular building called the Anastasis. In 1009 the roof and upper parts of the rock walls of the tomb were destroyed by Muslims. The present church, which shelters both the tomb and Calvary, was built by the Crusaders; seriously damaged by fire in 1808, it was later restored. Dissident Copts, Armenians, and Syrians share with Roman Catholics the use of the church.

Holy Spirit, THE. In Christian theology, the third person of the Trinity. The evolution of the doctrine goes back to the O.T., in which the term Spirit is used to denote the Divine Activity or God in Action.

The term itself, both in Hebrew and in Greek (*ruach* and *πνεῦμα*), originally meant "breath" or sometimes "wind," the underlying idea being that of invisible force. "The Spirit," therefore, in the first instance signified the Divine invisible force which actuated and energised the whole universe. It was the agent of God in creation—of prophetic inspiration—the dynamic of moral progress. With development of a pure monothe-

ism and abandonment of anthropomorphic conceptions of God the work of the Spirit received emphasis, until it was finally hypostatized and differentiated from God. In the Wisdom literature the Spirit is often associated with the Wisdom of God, the former denoting more particularly the moral, the latter the intellectual form of the Divine activity.

In the N.T. the doctrine gained a new access of strength. In particular the governing adjective Holy, which in the O.T. is used twice only (Ps. 51, v. 11; Isaiah 63, v. 10), became an almost inseparable element in the idea. The result was that the activity of the Spirit was almost entirely restricted to the moral and spiritual sphere. The N.T., however, does



Holyrood. 1. Remains of the abbey.
2. Bedroom of Mary Queen of Scots in this Edinburgh palace

Augustinian canons regular. Its dedication, attributed by a 15th century legend to its founder's preservation from death by the miraculous appearance of a rood or cross, is more likely to have been associated with a golden cruciform casket bearing an ebony image of Christ, and containing what was regarded as a piece of the true cross, left to the king by his mother, Margaret. David presented this reliquary to his abbey, and it came to be known as the Black Rood of Scotland. Surrendered to Edward I in 1291, restored in 1328, it was taken into battle by David II, lost at Neville's Cross in 1346, was placed in Durham Cathedral, and disappeared at the Reformation.

The abbey was reconstructed in 1464, destroyed by the English 1544-69, reconstituted as the Chapel Royal in 1672, and reduced to ruins in 1768. It was discovered in 1911 that the foundations of the choir rested on those of an earlier church and burial-ground containing about 40 graves. For some time the occasional residence of Scottish kings, the abbey was the scene of the marriages of James II, James III, James IV,



Darnley, and the audience-chamber. A dark stain on the floor outside the private apartments is said to have been made by the blood of Rizzio (*q.v.*). Much care has been taken to keep the structure of the palace in repair. See Ceiling; Edinburgh; consult also History of Holyrood, publ. R. M'Bean, 1870; Historical Sketch, Sir H. E. Maxwell, 1915.

Holy See. Term denoting the episcopal see of the R.C. church in Rome. It is more generally applied, however, to indicate the pope as supreme pontiff, together with those associated with him in the Vatican in the general government of R.C. international affairs.

Holy Sepulchre, CHURCH OF THE. Building in Jerusalem over the supposed tomb of Christ.

not always make a clear distinction between the Holy Spirit and the Spirit of the Risen Christ; in fact sometimes, as in 2 Cor., 3, v. 17, "The Lord is the Spirit," it seems to identify the two conceptions. The best definition of the function of the Spirit in the N.T. is to be found in the fourth gospel. He is "the Spirit of Truth," and will lead men to a knowledge of the truth (John 16, v. 13). He is the Divine Paraclete who bears witness to Christ (15, v. 26). "Sin, righteousness, and judgement" are the three great themes which form the essence of His message (16, vv. 8-11). In the history of the Early Church the Holy Spirit was the source of the Divine Power which fell upon the first Christian community at Pentecost, and of the spiritual endowments of the Apostles and other Christians.

The doctrine of the Spirit never became a matter of serious controversy in the history of the Early Church, though it was always to a greater or less degree involved in the Christological and Trinitarian controversies of the first four centuries. The only heresy which was specially concerned with it alone was Macedonianism, which, while accepting the Nicene formula on Christology, denied the consubstantial Divinity of the Holy Spirit. In later times a controversy on what is known as the "filioque" clause of the Nicene Creed caused the final cleavage between the Eastern and Western Churches, since the Eastern Church while acknowledging the procession of the Holy Spirit "from the Father," refused to accept the clause concerning the "procession from the Son."

Consult The Holy Spirit in the Ancient Church, H. B. Swete, 1912; The Interpreter Spirit and Human Life, A. J. Macdonald, 1944.

Holy Thursday. Name given to the day on which the Christian Church commemorates the Ascension of Jesus Christ. Being forty days (both inclusive) from Easter Sunday, this festival falls always upon a Thursday. Maundy Thursday is also sometimes, but incorrectly, called Holy Thursday. *See* Ascension.

Holy Water (Lat. *aqua benedicta*). In the R.C., Greek, and Russian Churches, water blessed by bishop or priest. It is placed in a basin or stoup at church entrances. The original idea seems to have been that worshippers should wash their hands, and so be able to lift up pure hands in prayer. Its modern use is symbolical, and

derived from Jewish custom, by which washing of the hands is still prescribed before devotions. The Romans had a similar ceremonial use of the *aqua lustralis*.

In apostolic times the only holy water, apart from that mingled with the wine at the Eucharist, was that used at baptism. In the Anglican communion the use of



Holywell Street, London, in 1900, looking west

From *London Vanished and Vanishing*, by Philip Norman, by courtesy of Adam and Charles Black

holy water was abandoned at the Reformation, but the baptismal service contains a prayer for the sanctification of "this water to the mystical washing away of sin." *See* Baptism; Lavabo.

Holy Week. To Christians, the week before Easter. A period of special solemnity in the Christian Church, it is also called the Great Week, though neither term appears in the Book of Common Prayer. The application to it of the name Passion Week is incorrect, that being the week following Passion Sunday, or the 5th Sunday in Lent. In the time of S. Chrysostom (c. 400) religious exercises of fasting, prayer, and almsgiving were increased, business was suspended, and prisoners were released in commemoration of Christ's death and burial. *See* Easter; Passion Week.

Holywell. Urban district and market town of Flintshire, Wales. It stands on the Dee estuary, 4 m. N.W. of Flint. It makes rayon, and was formerly noted for its flannel. It takes its name from S. Winefride's Well (q.v.), the "holy well," one of the wonders of Wales, the waters of which were said to have remarkable curative powers, and also supplied a number of mills with power until it ceased to flow in 1917. The well,

fed from a reservoir, is covered by a Gothic chapel, erected by the countess of Richmond, mother of Henry VII. The remains of Basingwerk Abbey (12th century) are near by. Market day, Mon. Pop. (1951) 8,197.

Holywell Street or BOOKSELLERS' ROW. Former London thoroughfare between S. Clement Danes and S. Mary-le-Strand, named after a spring, once a halting place for Canterbury pilgrims. Its 17th cent. houses were used successively by silk mercers, dealers in second-hand clothing, and second-hand and discount booksellers. The Opéra Comique Theatre here was built partly on the site of Lyon's Inn, an old chancery inn. The street, closed in 1901, was demolished in the Strand improvement scheme. *See* Aldwych; Strand.

Hollywood. Urban district and seaport town of co. Down, N. Ireland. It is on Belfast Lough, 4 m. N.E. of Belfast. A church was founded here by S. Laisaran, son of Nasca, in the 7th century, and the place was called after him Ard-Mic-Nasca, height of the son of Nasca. In the 16th century the church was bestowed on the Franciscans, who established a small monastery, its site now marked by the ruins of a later church. A solemn league and covenant for the defence of the kingdom was signed here in 1644. Pop. 6,359.

Holy Year. In the R.C. church, year in which extraordinary plenary (jubilee) indulgence is granted by the pope to all who make a pilgrimage to Rome. It begins on the previous Christmas eve with the opening, and ends 12 months later with the closing, of the holy doors at the basilicas of S. Peter, the Lateran, S. Paul, and S. Mary Major, which are walled up between holy years. The first recorded holy year was in 1300, and it has since been kept at the successively reduced intervals of 100, 50, 33, and 25 years.

Holz, AKNO (1863-1929). German writer and poet, born April 26, 1863. His first publication, *Klinginscherz*, a volume of verse, appeared in 1882. An admirer of Zola, he gave rein to realism in the *Buch der Zeit*, 1885 and 1892, and in *Neue Gleise*, 1892. He extended this treatment to his plays, several of which were written in collaboration with Jerschke. Amongst these may be mentioned *Traumulus*, 1904; *Frei* 1905. *Phantasia*, 1899, contains poems of beautiful rhythm. Holz died Oct. 26, 1929.

Holzminden. Town of W. Germany, in Lower Saxony. It is an inland port on the Weser, about 30 m. N.W. of Göttingen, and it makes iron, wood products, glass, chemicals, and machinery. Boat-building is also carried on. Pop. (1949) 21,000.

Homage (late Lat. *homaticum*, old Fr. *homage*). Profession of allegiance made to his lord by a feudal tenant on receiving his property. The profession was made in the following words: "I become your man (*homo*) for the lands which I hold of you, and will be faithful to you against all men, saving the fealty which I owe to my lord the king." To some extent the practice survives in England at the present day, for a bishop still does homage to the sovereign on his appointment to a see. At a coronation bishops, princes of the blood, and peers in their respective order do homage to the newly crowned sovereign. See Feudalism; Investiture.

Homatropine. Alkaloid prepared from tropine and mandelic acid and closely related to atropine. Colourless crystals insoluble in water, with the molecular formula $C_{16}H_{21}O_3N$. The hydrobromide is a white crystalline powder, used in medicine to produce dilatation of the pupil, for examination or treatment of the eye.

Homburg vor der Höhe. German town and spa, 9 m. N. of Frankfurt-on-Main. Formerly in Prussia, it is in the *Land* of Hesse. Saline and chalybeate springs, known since the early 17th century, made it fashionable in the 18th, and it received patronage from the prince of Wales (Edward VII). Its castle, built 1685, was the residence of the landgraves of Hesse to 1866; the nearby Saalburg, one of the biggest Roman castles, reconstructed by William II, a lavish Kurhaus, and parks and surrounding hills, were further attractions. The notorious casino was closed in 1872. Some engineering, leather work, chocolate making, and above all hat making are carried on in the outskirts of the town; the soft Homburg hat was popularised by Edward VII. Pop. (1949) 25,770.

Home, EARL OF. Scottish title borne since 1605 by the family of Home or Hume. The family became known on the borders in the 14th century, and soon won wealth and importance. Sir Alexander Home was killed at Verneuil in 1424, and a later Sir Alexander was made Lord Hume in 1473. Alexander, the 6th lord, having

figured in the disorders of the times in Scotland, went with James VI to England in 1603, and was made an earl in 1605. The title came in 1841 to Cospatrik Alexander, who married the heiress of the last Baron Douglas, and in this way Douglas Castle and other lands in Lanarkshire of the great Douglas family passed to the Homes, who have since been known as Douglas-Home. The 11th earl was made a peer of the U.K. as Baron Douglas in 1875. Alexander Frederic, 14th earl (b. 1903), succeeded his father in 1951. The family estates are in Berwickshire and Lanarkshire, and the eldest son is known as Lord Dunglass. *Pron.* Hume. See Douglas.

Home, DANIEL DUNGLAS (1833-86). Scottish spiritualist medium. He was born near Edinburgh,



D. D. Home,
Scottish spiritualist

March 20, 1833, and inherited psychic gifts from his mother, Elizabeth McNeill, who was credited with second sight. He was taken to America and adopted by an aunt, who was

so disturbed by manifestations of occult influence that she turned the boy out of her house. Before he was 20 his séances had made Home famous in the U.S.A., where distinguished men proclaimed the genuineness of phenomena witnessed by them. Home came to England in 1855, and in the course of the next 17 years acquired a prodigious reputation there and on the Continent, where his séances and lectures convinced scientists. Among the sceptics was Robert Browning, who pilloried him in *Mr. Sludge the Medium* (1864).

Home was twice married, both his wives being Russians of high birth. In 1872 his health gave way, and he spent the rest of his life in retirement abroad, dying at Auteuil, June 21, 1886. A large quantity of literature has grown up around Home and his gifts, or pretensions, as to which no complete explanation has yet been given. He compiled *Incidents in My Life*, 1863, and wrote *Lights and Shadows of Spiritualism*, 1877. Consult *Experiences in Spiritualism with D. D. Home*, Earl of Dunraven, 1924.

Home, JOHN (1722-1808). Scottish dramatist. Born at Leith, Sept. 21, 1722, he was educated

at Edinburgh university. After an adventurous connexion with the rebellion of 1745, in which he fought on the royalist side, he became minister of Athelstaneford, near Haddington. Here he began to write his plays and poems, being chiefly remembered by his rhetorical tragedy *Douglas*, which, produced at Edinburgh in 1756, enjoyed great contemporary success. Compelled to resign his charge by the Edinburgh presbytery, who regarded playwriting as incompatible with the ministry, Home ultimately became tutor to the prince of Wales, and received a pension from his old pupil when the latter came to the throne as George III. He died at Merchiston, Sept. 5, 1808.



John Home,
Scottish dramatist
After Raeburn

Home Chat. Weekly magazine for women, founded by Alfred Harmsworth, later Lord Northcliffe. Its first issue was on March 23, 1895. With *Answers* and the *Sunday Companion* it helped to found the fortunes of what is now the Amalgamated Press (*q.v.*).

Home Counties. Name given to the counties round London: Middlesex, Surrey, Kent, Essex, Hertfordshire.

Home Fleet. Units of the Royal Navy based on ports in the U.K. During the Second Great War it was called the Atlantic Fleet. It is responsible for the defence of the North Sea, N. Atlantic, English Channel, and areas as far as Gibraltar.

Home Forces. Command of the British army during the Second Great War. In Sept., 1939, the command of the army at home was based on a static organization comprising Eastern, Western, Northern, Southern, Scottish, and Aldershot commands and two independent districts, all headquarters working under the War office. But in May, 1940, G.H.Q. Home Forces was formed, the commands and independent districts coming under it. After D-day, June 6, 1944, the number of troops in the U.K. decreased until in July, 1945, it was possible to disband G.H.Q. Home Forces, organization of the army reverting to the 1939 basis. Training forces for service abroad was the responsibility of Home Forces, as well as the formation of the 21st army group for the invasion of Europe.

HOME GUARD: A GREAT CITIZEN ARMY

Lieut.-Gen. Sir Douglas Brownrigg, K.C.B., D.S.O.

The story of Great Britain's part in the Second Great War would be incomplete without this account of the remarkable body which sprang into existence overnight at the most critical period of the struggle, to become a very great potential asset in home defence

The Home Guard, originally the Local Defence Volunteers, began its four and a half years of life on May 14, 1940. This was the day on which the German armoured formations broke through the 9th French army about Sedan; but it was quite by chance that Anthony Eden, secretary of state for War, had selected that moment for a broadcast appeal for volunteers from men of all ages between 17 and 60 who were capable of handling a gun. The force was called into being to oppose the possible landing on British soil of German parachute troops. The reports of such landings in Norway, France, Belgium, and Holland had suddenly awakened the people of Great Britain to the realization that they could no longer rely on sea power alone to protect them from invasion.

Rapid Enrolment

In ten days 400,000 volunteers had enrolled, and by the end of the month the figure had risen to one million. On its first birthday the total was about 1½ millions, and on its "standing down" Nov. 1, 1944, there were well over 1½ millions on the strength. The Local Defence Volunteers began enrolling when Great Britain stood in greater peril than at any time since the Napoleonic threat, but when they stood down that peril had passed and victory was certain.

The Home Guard was never actually engaged with the enemy, except for those members who had voluntarily joined, or had been compulsorily posted to, the heavy and rocket batteries of A.A. units; but there is no question that the existence of this great national part-time unpaid army, which had been allotted a definite and most important rôle in the defence of Great Britain, enabled the military authorities progressively to liberate regular forces, first for training at home as opposed to garrison duties, and later for service overseas in armies of liberation.

In the earliest days volunteers armed themselves with shotguns and any other personal weapons on which they could lay their hands; and an official issue was begun after two months of a few P.14 rifles made available from the U.S.A., together with an allow-

ance of ten rounds of ball ammunition for each weapon. Gradually this trickle of rifles swelled into a flood of lethal appliances, until the average battalion was armed with a variety of weapons, including rifles, bayonets, light automatics, machine carbines, heavy machine-guns, spigot mortars, and mobile artillery in the shape of Smith guns. Members of the force were also trained in the use of many types of grenades. The basis of training was the defence of their own localities, which implied strategic immobility; but no defence being complete without tactical mobility, this was supplied by a certain amount of mechanical transport and the use of members' own cars, licensed and insured by the government.

It is idle to generalise about a force which was raised in localities of such varying character. One battalion in the Highlands was recruited over an area of 900 sq. m., whereas a sector in outer London comprised nine battalions all located within 50 sq. m. Besides the general battalions raised in each locality, there were special units, companies, or battalions, largely raised from the big factories, railway companies, and electricity and gas works. These were originally raised for the defence of their own premises, most of which were recognized as points of danger. But as ideas of local defence were revised, they gradually merged into the general defence schemes.

Women Auxiliaries

In time the work done by the women's services with the regular forces persuaded the government to admit women as "auxiliaries" in the Home Guard; but women were never given the full recognition they deserved as fulfilling in the Home Guard a rôle similar to the one they performed in the regular forces.

During air raid attacks from 1940 onwards the Home Guard took a big share in helping Civil Defence. In London 200 men in each battalion were trained in light and heavy rescue work; every night each battalion provided an inlying picket at platoon strength for any emergency call.

In 1942 compulsory enrolment in the Home Guard was intro-

duced for those who were of suitable age and not performing work of national importance which might suffer in consequence. This kept up the numbers in the force, but had little or no effect on its spirit, which had been voluntary and remained so. The maximum amount of training which could be demanded from a member was 48 hours a month; but this was usually exceeded by officers and n.c.os. in a great many battalions.

Service was unpaid; but a scale of subsistence allowances was laid down to prevent a man from being out of pocket through travelling to and from his place of parade, or through providing himself with extra meals away from home. Army uniform was provided.

After a time a small regular staff was allotted to each battalion or corresponding unit, consisting of an adjutant, a captain in charge of administration, and one or more permanent instructors. Sector headquarters had a regular training officer and a staff officer. From 1941 Home Guard officers were given king's commissions.

Although an improvised force, the Home Guard was exceptionally well-trained, and in the later years of the war was adequately armed and equipped. A large proportion of its officers and men were experienced soldiers of the First Great War, and its ranks included many retired regular generals and admirals. The force was disbanded on Dec. 31, 1945.

The Home Guard was re-formed on a voluntary basis in April, 1952, by an act of Dec. 7 of the previous year, when most of the regular army was serving overseas and the Korean War threatened to develop into a wider conflict. In March, 1956, its strength was reduced to a cadre of 1,794 officers and n.c.os. and a reserve roll of 59,081. No longer an active force, the revived Home Guard was disbanded on July 31, 1957.

Homeless Children. Children deprived of normal family life. Provision for such children developed in a piecemeal way in England, private philanthropy having started societies like the Foundling Hospital (q.v.). Dr. Barnardo's, and the national children's homes. With the abolition of boards of guardians in 1930, it became the duty of every public assistance authority to provide shelter for destitute children. These authorities could place children in voluntary homes known as certified homes. Both voluntary societies and public assistance

authorities could also board children out in foster-homes selected and inspected by them.

In 1947 there were 886 voluntary homes registered with the Home Office; the six largest voluntary societies being linked through the association of children's homes. Ap-

proximately 70 voluntary societies cared for 33,500 children; public assistance authorities for 32,885. Children in approved schools, remand homes, evacuation hostels, residential special schools, and boarded out with foster-parents brought the total of homeless children to 124,900.

Public concern, aroused by several bad cases, led to the appointment in 1945 of the Curtis committee on care of children; its recommendation that responsibility for homeless children should be concentrated in one government department was followed by the co-ordination, 1947, in the children's branch of the Home Office, (the Scottish home department exercising similar functions in Scotland), of all functions relating to homeless children, which previously belonged some to the Home Office and some to the ministries of Education and Health; the number of local inspectors was also increased, and local authorities were required to appoint children's officers.

By the Children Act, 1948, a duty of providing for homeless children was placed upon the county or county borough councils as the local authority. This duty arises whenever a child under 17 has neither parent nor guardian, or is abandoned or lost, or where his parents or guardians are prevented by disease, infirmity, or other incapacity or circumstances from giving him a proper home and upbringing, and the intervention of the local authority is necessary for the child's welfare. Where a child has no parents or guardians, or they have abandoned him or are permanently incapable of or unfit to have care of him, the local authority may resolve that all parental rights shall vest in them. The local authority must provide accommodation and maintenance for children in their care either by boarding them out or by maintain-



Home Office. The offices in Whitehall, built in 1875

ing them in a children's home provided by them or by some voluntary society.

Home Office. Government department in the U.K. Its head, the Home secretary, is the senior of the eight secretaries of state. He has a special personal relation to the sovereign, for through him the king issues communications

to his people, and on his advice exercises the prerogative of mercy and right of pardon. He was formerly required to be present at the birth of royal children.

The establishment of the board of trade, the local government board (now the ministry of Health), the ministry of Labour, and other departments has relieved the Home Office of much public business; the main functions remaining to it are the preservation of the liberty of the subject, public safety, the administration of justice, the control of foreigners and the grant of naturalisation, the protection and care of children, administration of prisons, and control of the criminally insane.

The Home secretary has direct control over the police in London and indirect control in the provinces. He has duties with regard to elections, liquor licensing, and the control of dangerous drugs. *See also Home Security.*

HOMER AND HIS TWO GREAT EPICS

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This article is supplemented by the account of Greek Literature, and by those on the other Greek poets and dramatists, e.g. Hesiod and Sophocles. See Epic; Troy; and the characters of the Homeric poems, e.g. Achilles; Hector; Helen; Menelaus; also Mythology

Homer (Gr. Homēros) was the reputed author of the famous Greek epics, the Iliad and the Odyssey. The ancient accounts of his life are legendary and unhistorical. Some scholars regard him not as an individual, but as a type of the wandering bard, while others consider him a purely mythical figure, like Orpheus. There seems, however, no reason to doubt that a poet named Homer really existed. Seven cities, Smyrna, Chios, Colophon, Salamis (in Cyprus), Rhodes, Argos, Athenae, each claimed the honour of having been his birthplace; the period at which he lived is variously placed, ranging from 1200 B.C. to 850 B.C. or later. The original home of the poems was the west coast of Asia Minor, in Aeolic Smyrna and Ionic Chios, where a clan called the Homeridae (descendants of Homer) is known to have lived, who devoted themselves to the recitation of the poems.

Tradition describes him as blind, a characteristic of the bard unfitted to be a warrior, just as the author of the Delian Hymn to Apollo, wrongly attributed by the ancients to Homer, describes himself as a blind singer from rocky Chios. Besides the Iliad and the Odyssey, several other poems were

attributed to Homer: the so-called Homeric Hymns, the battle of the frogs and mice, a satirical poem called Margitēs (the Block-head), and a collection of epigrams, nearly all of later date.

The nucleus of the Homeric poems was the story of Troy, and the legends that grew up around it. The Iliad (about 15,500 lines) relates the events of 51 days of the tenth and last year of the siege of Troy by the Greeks. The central incident is the wrath of Achilles, his withdrawal from and subsequent re-entry into battle after the death of his friend Patroclus. The Odyssey (12,000 lines) describes the wanderings of the "crafty" Odysseus (Ulysses), a typical Ionian seafarer, on his way back from the Trojan war, his return home, and the vengeance exacted by him from the suitors of his wife Penelopē.

The Homeric epics, sung by the rhapsodes (professional bards), soon became known all over the Greek-speaking world as the national poems, it might almost be said as the national bible. Herodotus declares that Homer (and Hesiod) were the creators of the Greek religious system. Plato calls him the educator of Greece, and he was known as *the poet*. The Athenian legislator Solon laid

down regulations for the recitation of the poems, and Peisistratus, the "tyrant" of Athens (c. 540 B.C.), set up a commission to edit the complete text in a definite form for recitation at the national festival of the Panathenaea.

From an early date the poems engaged the attention of the learned, chiefly the philosophers and rhetoricians, who explained them allegorically or subjected them to a rationalistic method of treatment. The first real critical work in connexion with the text and its elucidation was done by the Alexandrian grammarians in the 2nd century B.C. Most prominent amongst these were Zenodotus of Ephesus, Aristophanes of Byzantium, and Aristarchus of Samothrace. To this period also belongs the division of the *Iliad* and *Odyssey* into 24 books each. The work by these scholars was carried on in the East for centuries, but in the West Homer was almost forgotten during the Middle Ages, and remained so until the revival of Greek studies, which received its main impetus from the influence and efforts of the Greek scholars who fled from Constantinople after its capture by the Turks in 1453. The first printed edition of Homer appeared in 1488.

The Disputed Authorship

In ancient times the authorship of both the *Iliad* and the *Odyssey* was generally attributed to Homer, although it was admitted that they contained numerous interpolations; it would be natural for wandering bards to add interest to the narrative by introducing the cities and mythical ancestors of the chieftain whose hospitality they were enjoying at the time. But even in the Alexandrian age certain critics called Chhorizontes (the separators) assigned the *Odyssey* to a different poet and a later date. In modern times, the critical study of the Homeric poems began with F. A. Wolf, who in 1795 put forward the theory, now substantially accepted, that the *Iliad* and the *Odyssey* were each made up of a number of separate short lays, the work of one man, containing the chief incidents, afterwards amplified by others and finally combined into a whole. It is generally agreed that the *Iliad* and *Odyssey* are certainly not by the same author and that they belong to different periods of time. The general tone of the *Odyssey* indicates a later period of civilization; the atmosphere is less heroic, less warlike, less primitive, the language and

descriptive style are different; the sphere of geographical knowledge is extended; and, above all, the religious views and feelings are not the same.

The narratives of the *Iliad* and *Odyssey* dealt with only a small section of the Trojan legend. To supplement this, a number of poets belonging to the Ionian school, natives of places far apart and whose dates ranged from about 776-570 B.C., endeavoured to furnish a consistent account of pre-Homeric and post-Homeric happenings in such a manner as to present a complete mythological cycle, or circle, of Trojan and other heroic legends. These poems were afterwards arranged in chronological order by grammarians in a prose version called the epic cycle, their authors being referred to as the cyclic poets.

The chief of these epics were the *Cypria* of Stasinus of Cyprus (sometimes described as the son-in-law of Homer), an account of events from the marriage of Peleus to the beginning of the Trojan war; the *Aethiopis* and the *Destruction of Troy* by Arctinus of Miletus (c. 770 B.C.), the first relating the slaying of the Aethiopian Memnon by Achilles, the death of Achilles himself, and the suicide of Ajax; the little *Iliad* of Lesches of Mitylene (c. 700 B.C.), dealing with the events of the war from the quarrel over the arms of Achilles to the capture of the city; the *Nostoi* of Hagias or Agias of Troezen (c. 740 B.C.), describing the return of the heroes from Troy; and the *Telegonia* of Eugamon of Cyrene (c. 560 B.C.), named after Telegonus, the son of Odysseus by Circe, who, in quest of his father, unwittingly killed him.

A later treatment of the end of the war was that of the Greek poet Tryphiodorus, in his short epic *The Capture of Troy*, dating from between the 3rd and 5th centuries A.D.

Although the question of the authorship and mode of composition of the poems will probably never be satisfactorily answered, their place in the world's literature remains unassailable. They are the oldest monuments of Greek literature, and furnish, in abundant detail, material for the study of early Greek religion and the conditions of society. Matthew Arnold calls them "the most important poetical records existing," characterised by rapidity, plainness of thought and diction, and nobility of conception, and, notwithstanding certain defects of detail and construc-

tion, they remain unsurpassed as works of art. Not only succeeding writers in epic and other branches of poetry, but artists also drew inspiration from the figures that crowd their pages. Zeus (Jupiter), Apollo, Achilles, Hector, Odysseus, Penelope, and others are familiar literary and artistic types. The influence exercised by the Homeric poems through the medium of Virgil is clearly shown in such works as Milton's *Paradise Lost*, Tasso's *Gerusalemme Liberata*, and Dante's *Divina Commedia*.

Bibliography. The literature of Homer is vast. For the English reader, *The Problem of the Homeric Poems*, W. D. Geddes, 1878; *Introduction to Homer*, R. C. Jebb, 6th ed. 1896, and the English prose translations by A. Lang, W. Leaf and E. Myers (*Iliad*); S. H. Butcher and A. Lang (*Odyssey*); and E. V. Rieu (both) are to be recommended; also the *Odyssey* of T. E. Lawrence, 1935. Pope's translation remains the best attempt in verse. Useful editions of the text with English notes are: *Iliad*, W. Leaf, 2nd ed. 1900-02; D. B. Monro, 4th ed. 1894; *Odyssey*, W. W. Merry, i-xii, 2nd ed. 1886; xiii-xxiv, D. B. Monro, 1901.

Homer, WINSLOW (1836-1910). American painter. Born at Boston, Mass., Feb. 24, 1836, he studied at the New York National Academy of Design. During the American Civil War he contributed sketches to *Harper's Weekly*, and began to paint and exhibit genre pictures bearing on the war. He was elected associate of the American Academy in 1864, academician in 1865, and received many other honours. Homer did not confine himself to military subjects, but painted genre of every description and some landscapes. His style, technically crude at first, later developed genuine power, while he was throughout independent of the recognized schools of art. He died Sept. 30, 1910.

Homer Pigeon or **HOMING PIGEON.** Name given to a breed of domestic pigeon used for carrying messages or for racing. It is so called from its remarkable instinct in returning to its home at full speed when released many miles away. Since Roman times homer pigeons have conveyed messages in military operations. Numbers were used in both Great Wars by the Royal Corps of Signals, and in Great Britain they proved valuable when air raids disrupted telephonic communication. Pigeons also served with the R.A.F., two accompanying each aircraft on operational flights, lest the aircraft was forced down and the radio put out of action.

Homerton. Part of the met. bor. of Hackney, London, E., bordering Hackney Marsh in the E. The Eastern Hospital for infectious diseases and the Hackney General Hospital are in Homerton; the Congregational training college, founded in the 17th century, was destroyed during the Second Great War, when the district suffered severely from German bombing. Homerton was a fashionable suburb in Stuart times. The Old House at the Corner, a Tudor residence near Sutton Place, is owned by the National Trust.

Home Rule. Name given to the Irish movement for self-government between 1870 and 1914 and to the measures taken to establish a separate Irish parliament. Discontent with the political union of 1801 became canalised into a parliamentary programme after 1870. C. S. Parnell, elected M.P. 1875, became chairman of the Home Rule movement in 1880, took all Home Rulers into permanent opposition, and led a policy of obstructionism, designed to bring the proceedings of parliament to a standstill until Home Rule was granted. In 1885 the Home Rulers secured for them a position in which they held the balance between Liberals and Conservatives.

In 1886 Gladstone, then Liberal prime minister, introduced the first Home Rule bill, which split his party. The bill was defeated, as was the government in the subsequent election. But Home Rule remained in the Liberal programme throughout the party's period in opposition, 1886-92. Returning to power in 1892, Gladstone introduced a second Home Rule bill in 1893. This was passed by the commons only to be rejected by the lords. From then until 1912 Home Rule remained in abeyance, as it was obvious that any further bill the commons might pass would meet with the same fate. But the Parliament Act of 1911, which curbed the veto of the lords, opened the way for the third Home Rule bill of 1912, introduced by Asquith's Liberal government. This met a troubled course on its way to the statute book, and caused feeling between the parties to run dangerously high. The lords threw the bill out twice.

The final fight began in March, 1914. Modifications had been made respecting the position of Ulster, which was by this time in a state bordering on armed resistance against the bill. The government now proposed to deal with Ulster in an amending bill which

provided that she could vote herself out of the Act by counties. The house of lords proceeded to amend the revised bill in ways obviously unacceptable to the commons, thus creating a deadlock. At the suggestion of King George V, a conference was held at Buckingham Palace between representatives of government, opposition, Nationalist, and Ulster members, but no conclusion was reached. The conference broke up almost on the eve of the First Great War. The government insisted on the bill's passage into law, though a bill was also passed postponing the operation of the Home Rule Act for one year or until after the war had ended. The Home Rule bill received the royal assent Sept. 18, 1914.

The Act reduced Irish representation in the U.K. parliament, and provided *inter alia* for an Irish senate (40 members) and house of commons (164), also for the recognition of the supreme authority and power of the U.K. parliament, naming explicitly all the subjects on which the Irish parliament could not legislate. This 1914 Act was generally accepted by the Nationalist party. But events moved so rapidly during the war and ideas were so radically transformed that the Act passed out of the sphere of practical politics, the growth of Sinn Féin making Home Rule as such a controversy of the past. The provisions of the Government of Ireland Act, 1920, successor to the stillborn Act of 1914, are best studied in relation to the general trend of Irish history itself. See Eire; Ireland; Parnell, C. S.; Sinn Féin.

Home Security, MINISTRY OF. British govt. dept. established Sept., 1939, to be responsible for protection of the public and its property during the Second Great War. The Home secretary was minister and eventually assumed control over a wide variety of home front activities, including the direction of Civil Defence (*q.v.*) and the enforcement of Defence Regulations (*q.v.*). The first minister was Sir John Anderson, who was succeeded by Herbert Morrison in Oct., 1940. The ministry ceased to exist with the resignation of Winston Churchill's coalition on May 23, 1945, when its residuary functions were taken over by the Home office (*q.v.*).

Homestead. Term formerly applied to the place of a dwelling-house and the land immediately adjacent; now used specifically of a small agricultural holding. In

countries with large areas of unoccupied territory it is the term applied to tracts of crown or state land granted to settlers for occupation on advantageous terms, and legislation directed towards the encouragement of settlers on such, and securing their homesteads to them by exempting them from the claims of creditors, is comprehensively known as Homestead and Exemption Laws.

The policy was initiated in the U.S.A. in 1862, when a federal Act was passed granting tracts of surveyed and otherwise unappropriated public land not exceeding 160 acres to any head of a family or other approved applicant on condition of his agreeing to occupy and cultivate such settlement continuously for at least five years, reduced in 1912 to three years. To encourage settlers the Act explicitly provided that homesteads so acquired should be immune from alienation from the settler in satisfaction of any debt incurred by him between entering on occupation and securing his final title to the land. Formal registration in a land office and payment of nominal fees constitutes "original entry" of a settler upon his homestead. At the expiration of the three years and upon proof of the continuous occupation and cultivation of the land, the government issues a certificate of title to the person who made the original entry or, if he be dead, to his heirs or assignees. This constitutes the "final entry" and gives perfect title to the homestead. After the First Great War in one year alone 9,000,000 acres in the U.S.A. were patented under homestead laws. Several states have also passed homestead acts, which incidentally confer on the homesteads concerned exemption from seizure for debt—a valuable privilege in times of commercial depression, as in 1929.

The system has been adopted in the British commonwealth. In Canada provincial crown lands are granted to approved applicants over 18 years of age in lots ranging from 160 to 640 acres, and loans are made to the settler upon advantageous terms. Details vary in the different provinces, but generally the conditions require the settler to reside on his homestead for at least 6 months in each of 3 years, to erect a habitable house thereon, to crop at least 20 acres, and to be a British subject. In Australia homesteads are procurable on similar terms. In the British dominions and also in the

U.S.A. special facilities are offered to settlers who have served in the armed forces. See Emigration.

Home, Sweet Home. Song by John Howard Payne (*q.v.*). Originally sung in Payne's opera, *Clari, the Maid of Milan*, produced at Covent Garden, London, May 8, 1823, for which Sir Henry Bishop wrote the music, it has been popular wherever the English language is spoken. It was one of the most effective lyrics in the repertoires of Patti and Melba.

Homicide (Lat. *homo*, man; *caedere*, to kill). In law killing a human being. Homicide may be criminal, justifiable, or excusable; the second and third are not crimes. Examples of criminal homicide are murder, manslaughter, and suicide. Justifiable homicide arises, *e.g.* (1) when a person sentenced to death is executed; (2) when a person kills to protect himself or his property from a serious and violent felonious attack, but the danger must be extreme. Excusable homicide arises *e.g.* when a man driving a motor car kills another by accident and without negligence. See Manslaughter; Murder.

Homicide Act. An act passed by the British Parliament in 1957 which substituted life imprisonment for death as the punishment for most murders. The act also (i) introduced into English practice the defence of diminished responsibility (which was already permitted in Scottish courts) under which a person is guilty not of murder but of manslaughter if at the time of the killing he was, while not insane, nevertheless suffering from such mental abnormality as substantially to impair his mental responsibility; (ii) provided that provocation (which reduces murder to manslaughter) need not be by a blow, but might be by anything done or said; (iii) made the survivor of a suicide pact guilty not of murder but of manslaughter; (iv) introduced a less gruesome form of death sentence namely, that the prisoner "suffer death in the manner authorised by law"; (v) ended the practice of posting a notice outside prison after an execution. See Murder.

Homildon Hill or **HUMBLEDON HILL.** Eminence near Wooler, Northumberland, known for the battle fought here between the English and the Scots, Sept. 14, 1402. A Scottish army, having ravaged the northern counties of England, was returning home when it found its road barred by a force collected by the Percys and

other northern lords. The leader of the Scots, the earl of Douglas, arrayed his men on the slopes of the hill, facing the English below. The English archers opened the fight, the Scottish reply being a charge of the men-at-arms down the hill. But this did not reach its goal. The accuracy of the archers was too much for the Scots. Many of the leaders fell, as did hundreds of the rank and file, and before coming to grips with the enemy the army broke and fled. A number of noble Scots were made prisoners.

Homily (Gr. *homilia*, intercourse). Term used formerly for philosophic teaching by means of familiar conversation. In eccles. usage it denoted a familiar discourse on some passage of Scripture—hence homiletics, a term for that branch of theology which treats of sermons and their composition. The earliest extant examples of the Christian homily are those of Origen, which for the most part survive only in Latin.

The Homilies of the Church of England were composed at the time of the Reformation and issued in two books in 1547 and 1563, the contents being appointed to be read in churches on "any Sunday or holy day when there is no sermon." The first book is believed to have been composed by Cranmer, Ridley, and Latimer; the second principally by Jewel. They appear to have been put together hurriedly to meet the special needs of the time, to confute heresy, and to assist the imperfectly educated parochial clergy. See Sermon.

Hominy (W. Indian). Inner part of the maize berry, coarsely ground. It is less oily than maize meal and lacks its somewhat unpleasant taste. Porridge is made with it as well as croquettes, fritters, and puddings.

Homo. Latin word meaning man. Scientifically it is used as the general term for mankind, *i.e.* for the genus of mammals which consists of the various groups of man. Man as a thinking being is distinguished as *Homo sapiens* (wise man). See Anthropology; Ethnology; Mammal; Man, etc.

Homoeopathy (Gr. *homoios*, like; *pathos*, feeling). System of prescribing drugs based on a special study of their action on healthy persons. The idea of curing "likes" with "likes" is very old; but the scientific investigation of drug action by experiment on the healthy, and the application of the results of this study in the healing of the sick, are due to Samuel Hahnemann

(1755–1843). It was while translating Cullen's *Materia Medica* into German that the idea of testing medicines on himself occurred to him. He was well aware of the curative effect of cinchona bark in cases of intermittent fever, but Cullen's explanation of its action failed to satisfy Hahnemann, and he thought he might gain some information if he took a dose himself when he was quite well. This he did, and experienced a typical access of chill, fever, and sweat.

This came upon him as a revelation. Cinchona bark cured intermittent fever because it had the power of producing an exact image of it in the healthy. But it produced in him a number of other symptoms not specially related to fever; and when cases manifested these, or similar, symptoms, he administered the remedy and cured the cases. For this type of treatment he coined the word *homoeopathy*.

Homoeopathic Dilutions

Hahnemann made the further observation that when a drug and a case of illness were homoeopathically related, the person suffering from the illness was immeasurably more sensitive to the drug's action than when in health, and unless he reduced the dosage in proportion to troublesome "aggravations" or intensifications of the symptoms were apt to occur. To avoid these he was driven to dilute his remedies more and more, and hence arose his discovery of the power of high infinitesimals, which form one of the best known features of the system.

One result of Hahnemann's discovery was that he was able to use preparations of deadly poisons with perfect safety. Further, he was the first to think of the possibility of using the virus of a disease as a remedy. This is analogous to the principles underlying vaccination, inoculation, and serum treatment. In many ways the discoveries of Hahnemann profoundly influenced medical practice. The chief British homoeopathic institution is the Royal London Homoeopathic Hospital, with 200 beds and a teaching staff. On the Continent, in Australia, in Canada, and in the U.S.A. and S. America, are many institutions of the kind. In the U.S.A. there are fully equipped colleges and universities. Homoeopathy constitutes the acme of individualism in the use of medicine. It treats the basic animal rather than the pathological condition. As no two persons are exactly alike, so no two cases of the same disease are identical,

and each may require a different remedy. Consult *The Principles and Art of Cure by Homoeopathy*, H. A. Roberts, 1943.

Homogamy. Botanical term descriptive of the condition in some flowers, *e.g.* chickweed, groundsel, in which anthers and stigmas are functionally mature at the same time. This usually results in self-pollination; but the relative positions of anthers and stigmas may make this improbable. The condition in which the two kinds of organ ripen at different times is termed dichogamy.

Homogenising. Process by which all the elements in a substance are evenly diffused throughout it, and prevented from separating out again. Its most familiar use is in the homogenisation of milk. In this the fat is split into small uniform-sized globules by heating the milk and forcing it through small orifices under high pressure. This prevents any cream from rising.

Homogenising is also an important metallurgical process. Many alloys exist in such a form that the composition is not uniform throughout. While this segregation is sometimes useful, *e.g.* in precipitation hardening, it often becomes necessary to remove or reduce the effect by diffusion. This homogenising entails heating the alloy to a high temperature. See Alloy.

Homologous Series (Gr. *homos*, same; *logos*, ratio, proportion). Term applied in chemistry to any series of organic compounds the terms or members of which preceding or following each other differ by CH_2 , or a multiple thereof. Gerhardt (1816-56) suggested the term owing to the proportional character of the compounds of a series. The general character, constitution, and properties of homologous series are similar. Hence it is possible to give general methods for the preparation of the substances. The gradation in physical properties is in some cases very striking, but generally the lowest of a series is an exception to the rule.

A good example is the specific gravities of the alcohol series—methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, and nonyl—in which there is a difference of 0.003 to 0.006 between the various members of the series, from 0.812 for methyl alcohol to 0.842 for nonyl alcohol. The molecular volumes show a still more constant difference. The boiling points rise as the series

ascends, but the difference grows smaller as the molecular weight increases. The melting points and solubilities of homologous series show two groups, distinguishable according to whether the number of carbon atoms is odd or even.

Homology. Morphological term for an affinity of structure. All organs of animals and plants which are based upon a similar morphological or structural type are termed homologous, irrespective of their function. An organ is said to be the homologue of another in a different animal when it conforms to a standard of similar structure. The trunk of an elephant is the homologue of, or homologous to, the nose of other mammals, because both are founded upon the same morphological plan, and its tusks are homologous to the incisor teeth of carnivores.

The forelegs of quadrupeds arise in the same manner in the embryo, and contain essentially the same structures, as do the wings of flying birds. Anatomically they are made in the same way. They are therefore homologous organs, even though they serve the purpose of locomotion in an entirely different way. The arms of a human being are homologous both to the wings of birds and to the fore limbs of quadrupeds, and contain at least some of the same bones. See Analogy; Embryology.

Homonym (Gr. *homos*, same; *onoma*, name). Word which has the same spelling as another, but a different meaning, *e.g.* right (opposite to wrong) is a homonym of right (opposite to left). Each right is a homophone of rite (ceremony) and write (inscribe).

Homoptera. Group of hemipterous insects, or bugs, in which the wings slope over the sides of the body. Fore and hind wings are alike, and the antennae are short. Frog-hoppers, cochineal insects, and greenflies belong to this group.

Homosexuality (Gr. *homos*, same; Lat. *sexualis*, sexual). Term for temperamental condition in which the sexual impulse is directed towards persons of the same sex. It appears to be fundamental in certain individuals, in others to have been induced by psychological maladjustment due to some childhood experience. For the views of psychologists consult *e.g.* Sex in Psycho-Analysis, Jones and Ferenszi; Outline of Abnormal Psychology, McDougall; Collected Papers, Freud.

Homosexuality between men has been recognized in English law since it was made an offence under

the Criminal Law Amendment Act of 1885; it is in men a ground for divorce. English law does not recognize it between women.

Homospory. Botanical term for the condition in plants which form one kind of spore only, *e.g.* ferns. In these plants each spore may germinate to produce a bisexual prothallus which bears both male and female reproductive organs (antheridia and archegonia). Horsetails are homosporous, but the prothallus which develops from any one spore is unisexual, bearing either antheridia or archegonia, a condition more usually associated with heterospory.

Homotaxy OR HOMOTAXIS (Gr. *homos*, same; *taxis*, arrangement). Term used in geology for the similarity of arrangement of fossils in different strata of rocks in different regions. T. H. Huxley thought the finding of similar fossils in two series of rocks in different parts of the globe was no proof that these beds had been deposited at the same time; this challenged an accepted geological axiom. According to modern views, homotaxy seldom if ever occurs. See Fossils.

Homs. A town of Syria, the ancient Emesa. Situated near the Orontes and the lake of Homs, it is about halfway between Damascus on the S. and Aleppo on the N. On the great road from the N. to Egypt, it was a caravan centre in former days; it is now on the Syrian rly., and still does a large trade. Its speciality is the manufacture of gold and silver thread, and it has a large textile industry. It is the seat of a Roman Catholic archbishop. In 272 it was the scene of the defeat of Zenobia, queen of Palmyra, by the Roman emperor Aurelian, and in 1832 of the victory of the Egyptians, under Ibrahim Pasha, over the Turks. During the First Great War it was occupied by the British without resistance, Oct. 15, 1918. During the Second Great War campaign in Syria, Homs was captured from the French Foreign Legion by the Household Cavalry, in July, 1941. Homs gives its name to a Syrian sanjak. Pop. of town, 100,142.

Honan. Interior province of China, in the Hwang-ho valley. It contains 111 counties, with Kaifeng as its capital. Other important cities are Chengchow, Loyang, Sinyang, Nanyang, and Anyang. The Peking-Hankow rly. runs through the prov. from N. to S., the Lunghai line from E. to W., and the Taoching rly. traverses the N. part. The principal products

are wheat, cotton, sesame, and coal. The leading coal mines being at Kiaotso and Liuhokou. Honan was the centre of ancient China, Loyang and Kaifeng being two early capitals. Area, 64,545 sq. m. Pop. (1953) 44,214,594.

Honan. Town of the prov. of Honan, China. It stands on the river Lo, at the junction of four roads which connect it with the great trade centres in the E., S., and W. It is the terminus of a branch rly. from the Peking-Hankow main line.

Honda. Town of Colombia. in the dept. of Tolima. It stands on the Magdalena river, near the head of navigation, 65 m. directly N.W. of Bogotá, with which it has rly. communication. From the town to the mouth of the river in the Caribbean Sea is about 600 m. The climate is extremely hot, as the town lies between the Central and Eastern Cordilleras. Honda is a depot for the quinine and tobacco trade of the surrounding districts, and was chartered as a town in 1643. Pop. 15,000.

Hondecoeter, MELCHIOR DE (1636-95). Dutch painter. Born at Utrecht, he studied under his father and J. B. Weenix, his uncle. Devoting himself to pictures of game, poultry, and other birds, alive or dead, he acquired great reputation in this branch of art. His earlier years were passed at The Hague, but about 1668 he was at Amsterdam, where he died April 3, 1695.

Hondo. Main island of Japan. The official name is Honshu (*q.v.*).

Honduras. Republic of Central America. Bounded N. by the Caribbean Sea, S. by Nicaragua and Salvador, and W. by Guatemala. It lies between lat. 13° and 16° N. and long. 83° and 89° W. The coast line on the Atlantic is 400 m. and that on the Pacific about 40 m. There are 17 depts. and one territory. Area 43,225 sq. m.

Honduras is divided into the Caribbean plains area, lofty inland mountains, and fertile plateaux, being mainly mountainous. Some of the richest and deepest soil in the world is found on the plains and in the many valleys. Human settlements predominate along the sea fronts and in these fertile valleys and plateaux. The highest mts. attain 8,000-10,000 ft.

The Nacaome and Goasoran rivers, discharging into the Pacific,

and the Ulua, Santiago, Chame-licon, Patuca, Roman, and Segovia rivers, which empty into the Caribbean Sea, are difficult to navigate, the Santiago being the most useful for transport. Lake Yojoa, 25 m. long by 6 m. wide, is navigable, and by the Blanco river communicates with the Ulua and so with Puerto Cortes on the Atlantic. Other ports are Trujillo, Roatan, and Omoa, with Amapala on the Pacific.

The dominant races are Indian and Spanish, and the republic includes a portion of the once powerful Maya empire, whose descendants are still numerous; while there are remnants of the ancient Carib Indian tribes. Pop. (1950) 1,505,465.

Daily Air Services

Life in Honduras was revolutionised by the coming of the aeroplane, nearly every town, and even many villages, formerly isolated from one another, being linked by often daily air services. Railways, used chiefly for carrying bananas, cover about 830 m. Tegucigalpa, the capital, is connected by road with the Pan-American highway and with San Lorenzo on the Gulf of Fonseca.

Honduras declared itself an independent republic in 1838. Under the 1936 constitution a president and 56 members of a chamber of deputies (one for each 25,000 citizens), the sole legislative body, are elected for six-year terms. Women received the vote in 1955. The national university is at the capital. Primary education is compulsory. All male citizens are liable for army service from 18 to 55 (in the reserve from 32-55) and must serve for eight months. Spanish is the official language, and Roman Catholicism the dominant faith. The monetary unit, established in 1931, is the gold *lempira*, worth 50 U.S. (gold) cents.

The country is agricultural, but the Rosario mines still yield over 2500,000 of silver and gold annually, while gold washing is carried out by many small companies and individuals. There are rich copper and magnetic iron ores, also coal, antimony, magnesite, cinnabar, and zinc on a small scale. As to exports, the banana accounts for over half the value. Mahogany and other hardwoods used to form a large item of export, and this is being resumed. The country also yields vegetable oils, rubber, citrus fruit, coffee, tobacco, coconuts, vanilla, indigo sarsaparilla, beans, and rice, while cotton is being raised experiment-

ally. The U.S.A. takes virtually all the exports of Honduras and furnishes four-fifths of her imports.

The climate is healthy on the plateaux, but fever is rife in the lowlands. The scenery is enormously varied, ranging from deep tropical jungles of the coast through dense, giant inland forests, strewn with superb wild flowers, until one emerges on to the bleak, jagged, and barren peaks. The fauna includes jaguar, puma, ocelot, coyote, deer, monkeys, opossum, armadillo, tapir, peccary, and ant-eaters. Birds of gorgeous plumage abound. Alligators infest the rivers, and snakes, tarantulas, centipedes, and scorpions are common.

Architecture varies from palm-thatch, adobe, and log cabins to classical Castilian mansions and modern American homes and tall office buildings. Wagons drawn by bullocks, lines of pack mules, and heavily burdened peons with shoulder packs jostle beside motor cars. The people are gay and hospitable.

Landings of Early Explorers

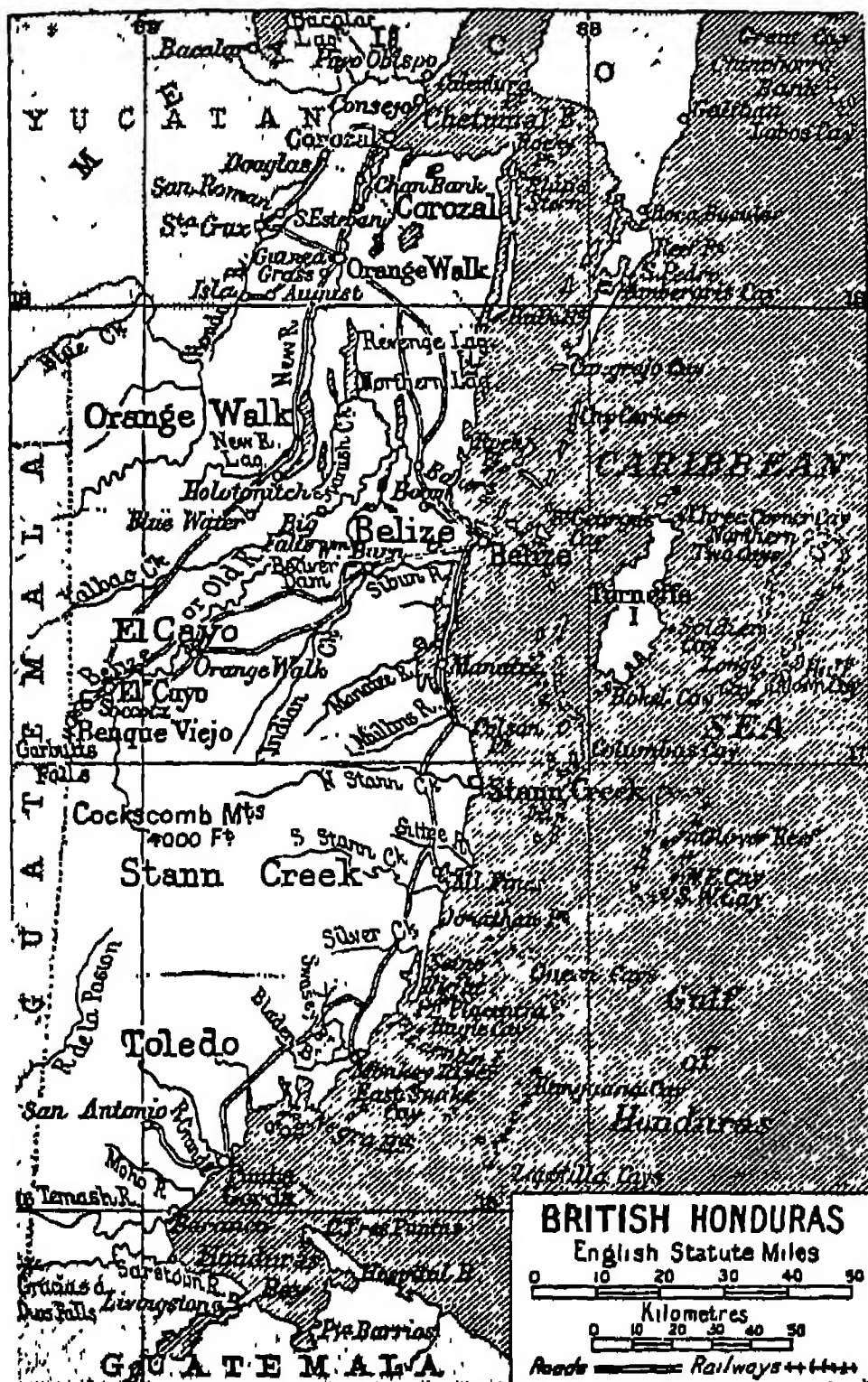
The spot where Columbus first set foot on the mainland of the New World in 1502 is now in Honduras. In 1522 Gil Gonzalez de Avila, starting from Panama, landed in Honduras and subdued the Indians. In 1525 came Cortes, who founded a town near the present Puerto Cortes, and spent a year exploring and collecting gold. Conflicts continued between the *conquistadores* until the government of Central America was firmly established in 1543 with Guatemala City as its capital. With the rest of Central America, Honduras achieved independence from Spain in 1821 and was a member of the Central American Federation until 1838. There have been intermittent attempts to establish a new union. The heritage of the country goes back to early Maya times; only 45 minutes by air from Tegucigalpa is Copan (*q.v.*), the ancient Maya capital, often called the Athens of America. In July, 1918, Honduras declared war on Germany. and in Dec., 1941, on the Axis. *Consult* Honduras, G. B. Reyna, 1930.

Grenville Holmes

Honduras, BRITISH. A crown colony of Central America, on the Caribbean Sea. It lies S. of Yucatan in Mexico and 662 m. due W. of Jamaica, with an area of 8,867 sq. m., slightly larger than Wales. The Honda river forms its boundary on the N., and the Sarstoon river on the S. The sur-



Honduras arms



British Honduras. Map of the crown colony in Central America on the Caribbean Sea

face in the coastal districts is low-lying and swampy, and numerous small islands and cays lie off the shore; the mountain slopes in the W. and S. are covered with vast forests, abounding in valuable furniture woods and dyewoods. The only river of importance is the Belize, which is navigable for vessels of light draught. The climate is hot, humid, and rather unhealthy. Flora and fauna are like those of Honduras (v.s.).



British Honduras arms

The chief exports are cedar, mahogany, logwood, bananas, sponges, citrus fruits, and cacao, and there is a large transit trade with American and other ports. Coffee and plantains are cultivated, and stock-raising is carried on.

The first settlers were probably woodcutters from Jamaica about 1638. In 1786 the British govt. appointed a superintendent; in 1862 British Honduras was declared a colony, subordinate to Jamaica; in 1884, it became a separate colony. The governor is assisted by an

executive council of seven and a legislative council of three official and ten unofficial members. The Royal Bank of Canada controls the local bank; the unit of currency is the dollar. The colony has six districts (see map). Old Guatemalan claims on the colony were revived 1946, when a British offer to place the dispute before the international court of justice was disregarded. Hostile Guatemalan demonstrations led to the dispatch to Belize, the capital, in Feb., 1948, of two British cruisers and a detachment of troops, which checked the demonstrations. Pop. (est. 1954) 78,000, of whom 600 were whites.

Honduras, GULF OF. Wide inlet of the Caribbean Sea, between Honduras, Guatemala, British Honduras, and Yucatan, Mexico. It contains Turneffe and Bay Islands, besides many islets, reefs, and rocks. From the island of Cozumel off the coast of Yucatan, to the mouth of the river Patuca at the E. of Honduras, the distance is about 380 m. The inlet sweeps inland about 250 m., terminating in the Gulf of Amatique, which forms an extension at its head. The gulf receives the waters of the Motagua and numerous other rivers.

Hone, WILLIAM (1780-1842). A British bookseller and author. Born at Bath, June 3, 1780, he was a lawyer's clerk at 10, and in 1800 opened a book and print-selling business in London, which failed. He started *The Traveller* in 1815 and *The Reformer's Register* in



William Hone, British author
After Patten

1817. He wrote successful political satires, but his parody of the Prayer Book in these involved him in three trials for blasphemy, 1817, his acquittal being followed by a public subscription of £3,000. The Political House that Jack Built, 1819, ran through 54 editions.

Hone's other works include *The Apocryphal New Testament*, 1820; *Ancient Mysteries Described*, 1823, dealing largely with the old miracle plays; *Every-day Book*, *Table Book*, and *Year Book*, issued serially, 1826-27, volumes still valued by antiquaries; and *Facetiae and Miscellanies*, 1827. The *Every-day Book* was finished, and its two successors composed, in a debtors' prison. He edited Strutt's *Sports and Pastimes*, 1830. For a time he was landlord of a coffee-house in Gracechurch Street. Converted by Edward Irving, he became an occasional preacher. He was a friend of Lamb, and worked hard for the freedom of the press and the promotion of cheap literature. He died Nov. 6, 1842.

Honegger, ARTHUR (1892-1955). Swiss composer. Born at Le Havre, March 10, 1892. he studied at the Zürich and Paris conservatoires. He then settled in France, and his first important work, a sonata for violin and piano, appeared in 1916. Two years later a large scale work, *Le Dit des Jeux du Monde*, fully revealed his individuality. During the 1920s he was one of "Les Six." He remained in Paris during the Second Great War, then taught in the U.S.A. He died in Paris Nov. 27, 1955.



Arthur Honegger, Swiss composer

Honegger's compositions inclined towards tragic subjects, austere forms, and harsh polytonality. His works include four symphonies; *Pacific 231* (descriptive of a locomotive); incidental music to Gide's *Saul*, and other plays and films; two oratorios, *Le roi David* and *Jeanne d'Arc au bûcher*.

Honesty (*Lunaria annua*). Annual or biennial herb of the family Cruciferae. It is a native of Europe, and has heart-shaped, toothed leaves, and terminal sprays of lilac flowers. The seed-vessels are flattened out to a broad oval-oblong disk, from which, when ripe, the two valves fall off, leaving the seeds attached to a



Honesty. Left, stalk with foliage and flowers. Right, seed-vessels

thin, silvery partition. They are then dried and used for decorations, as "everlastings."

Honey. Semi-fluid substance produced by certain species of bees for the nourishment of their larvae. In general use it refers to that produced by the domesticated hive or honey-bee (*Apis mellifica*), which obtains as raw material the nectar of flowers, carrying it in the honey-crops, where it is acted upon by a ferment which modifies its character. When the crop is full the bee returns to the hive and regurgitates the contents. To equalise the supply of food to the community the honey is stored in the waxen cells of the combs prepared for the purpose; and to encourage the bees to collect a surplus vastly in excess of their own needs, the beekeeper removes the combs as they are filled and substitutes empty sections.

Honey consists chiefly of levulose and dextrose, the former being the fluid portion. Its flavour depends to some extent upon the flowers that have been visited when that particular section of comb was being filled. Sometimes it is rendered black and unwholesome through the bees collecting the so-called honey-dew, which is really the excrement of aphides. Fresh honey should be of a bright straw-colour, and have a pleasant, delicate flavour and aroma. This is a valuable food, as it represents "natural" sugar. See Bee.

Honeyberry. Fruit of the nettle-tree (*Celtis australis*). Belonging to the family Ulmaceae, it is a native of the Mediterranean region. The blackish fruit resembles a wild cherry, and when ripe (in winter) is very sweet. See Nettle-tree.

Honey Buzzard (*Pernis apivorus*). Species of falcon common on the continent of Europe and occasionally seen in Great Britain during summer. The plumage is usually grey and brown on the upper parts with white below, and the

adult bird is 25 ins. long. It gets its name from attacking the nests of wild bees and wasps in order to feed upon the grubs. It also eats other insects, slugs, worms, and birds' eggs.

Honeycomb. Series of waxen cells made by bees to store their honey and pollen, and to contain their brood. The comb, as a whole, consists of double rows of hexagonal cells fixed at right angles to the comb base. The hexagonal shape of the cells is exactly the shape which provides the maximum of space with the minimum of material. Advantage has been taken of the fact by modern beekeepers to provide an hexagonally



Honeycomb. Series of hexagonal waxen cells from a wild hive

impressed wax foundation for bees to build on. The wax sheets are made by special roller presses. Each worker bee cell is about $\frac{1}{4}$ -in. in diameter, the cells for drones and queens (royal cells) being slightly larger. See Bee.

Honeycomb Moth. This insect is more correctly known as Wax Moth (*g.v.*).

Honey-Dew. The sweet, sticky excreta of plant lice and some scale insects. Often voided on to the stems and leaves of plants, it is sought after by ants, which frequently abound on vegetation infested with these insects. Honey-dew from the scale insect *Trabutina mannipara*, which feeds on tamarisk in Sinai, is called



Honey Buzzard. Specimen of the European falcon occasionally seen in Britain

manna and is eaten by the Arabs. It is thought to be the manna mentioned in Exodus. See Aphis.

Honey-Eater. Name given to the various species of Australasian birds included in the family Meliphagidae (*G. r. meli*, honey; *phagein* to eat). The largest being the size of a thrush, they have beautiful plumage and notably long curved beaks and cleft tongues. They feed on insects and nectar, extracting it from the deep flowers with their long tongues. Their plumage is greatly in demand for purposes of dress ornament.

Honeymoon. Name given to the first month after marriage, and therefore to the period spent by the pair as a holiday. Its origin is uncertain. See Marriage.

Honeystone. Mineral better known as Mellitic Acid (*g.v.*).

Honeysuckle. Graceful climbing shrub of the family Capri-



Honey-Eater. Specimen of Parson Bird or Poë honey-eater W. S. Herridge, F.Z.S.



Honeysuckle. Flower of *Lonicera periclymenum*

foliaceae, genus *Lonicera*. It has fragrant, tubular flowers of white, yellow, and all shades from rose to crimson, with the corolla generally two-lipped. The leaves are smooth and opposite, and the fruit is a small, red, single-seeded berry. Known in many parts of the country as woodbine, one kind is a native of Great Britain, while others have been introduced from various parts of the N. hemisphere. They thrive best in a fairly light loam and a sunny position. See Flower.

Honfleur. Seaport of France, in the dept. of Calvados, lying on the S. side of the Seine estuary, nearly opposite Havre. The town has many timbered houses, and

the wooden church of S. Catherine is noted for its two naves set side by side. Overlooking the town on the W. is the chapel of Notre Dame de Grâce, a favourite shrine of pilgrimage for sailors, which is said to have been founded in 1034.

Honfleur was taken by Edward III in 1346, and during the Hundred Years' War it changed hands several times until the English were expelled by Charles VII in 1440. It was occupied by the Germans in June, 1940, and liberated by British troops on August 25, 1944. Pop. (1954) 8,661.

Hong-Kiang OR RED RIVER. River of S.E. Asia. Rising in the N.W. of the Chinese prov. of Yunnan and flowing into the Gulf of Tongking by a delta, it is 500 m. long, and navigable for about half its length, i.e. to Manhao. Its valley contains part of the rly. from Yunnanfu to Hanoi.

Hong Kong. Island off the coast of Kwangtung prov., China. It lies at the entrance to the



Hong Kong arms

Canton river, and was ceded to Great Britain in 1841. Besides the island, which is 11 m. long and from 2 m. to 5 m. wide, the colony includes Kowloon, a strip of territory on the mainland ceded in 1860. To this was added in 1898, under lease for 99 years, the peninsula S. of a line drawn between Deep Bay and Mirs Bay, together with the islands of Lantow and Lamma, the district being known as the New Territories. The concession covers an area of 391 sq. m., including the island of Hong Kong, 32 sq. m. The pop. in 1955 was estimated at 2,340,000 (non-Chinese, less than 20,000).

Before 1839 the island of Hong Kong was merely a resort of Chinese fishermen. In that year the English traders came there from Canton.



Hong Kong. 1. Looking north from Victoria Peak across the fine quay-side buildings and harbour to Kowloon, on the mainland. 2. Stepped street in the Chinese quarter. 3. Des Voeux Road, the main street in the European city

An affray on the island in July, in which a Chinese was killed by some British sailors, led to war. The British expedition used Hong Kong as its base, and formally took possession of the island in Jan., 1841, the cession being confirmed by the treaty of Nanking, 1842; the charter bore the date April 5, 1843.

The site chosen for settlement was on the N. coast of the island, and the first sale of land took place in June, 1841. The city called Victoria, now stretches 4 m. W. to E. along a narrow strip of land between the hills and the sea. Hong Kong is in normal times the distributing centre for one-fourth to one-third of China's foreign trade. The harbour, of which a

magnificent view is obtained from Victoria Peak, a hill used as a residential quarter, is one of the finest in the world. Local industries include shipbuilding, the making of rope, cement, textiles, paints, silver and metal wares, and deep sea fishing. Kowloon is the main industrial area, and has rly. connexion with Hankow and Canton; there are an airfield and flying-boat base on the mainland.

Hong Kong, created a crown colony in 1843, is administered by a governor, assisted by an executive council and a legislative council. There is also a municipal council, with power to make bye-laws.

On December 8, 1941, following the outbreak of war, two Japanese divisions, supported by dive

bombers, launched an attack on the colony from the landward side. Strong pressure necessitated the withdrawal of British forces at Kowloon to Hong Kong on the night of Dec. 11-12. A demand of surrender was refused, and there followed three days of intense air, naval, and artillery bombardment, followed by a second ultimatum, which was also rejected. On Dec. 18, Japanese forces crossed the strait separating the island from the mainland, and by the 22nd the defenders were split into isolated groups lacking supplies, ammunition, and water. Outnumbered five to one, the garrison surrendered on Christmas Day. (*Consult* Maj.-Gen. C. M. Maltby's official dispatch, pub. 1948.)

The Japanese occupation terminated on Aug. 30, 1945, when a powerful British naval force entered the harbour. Hong Kong had been badly damaged, many public buildings, including the university, being in ruins; while the results of thirty years of afforestation had been destroyed. The formal Japanese surrender was made at Government House on Sept. 16.

After the war, Hong Kong suffered an acute shortage of houses and food, while there was an influx of Chinese seeking refuge from the disturbed mainland. Reconstruction, however, was rapid; the harbour was quickly repaired, an agricultural dept. was set up, and the fishing and other industries restarted. The U.K. allocated £3,250,000 for reconstruction, as well as £1,000,000 under the Colonial Development and Welfare Act. By 1949 the colony was again the most prosperous place in the Far East.

Hong Kong, UNIVERSITY OF. British university founded in 1911. Its nucleus was a college of medicine, and it was opened in



Hong Kong. Map of the important British crown colony on the coast of China, showing the island, and Kowloon and the New Territories on the mainland

1912, Sir Charles Eliot being the first president. There were faculties of medicine, engineering, science, and arts. The buildings were destroyed in the Second Great War, but the university was reopened soon after, the U.K. granting £250,000.

Hong Kong and Shanghai Bank. British banking corporation. It was established in 1866 by an ordinance of the legislative council of Hong Kong. The headquarters are in Hong Kong, and it has branches in many places in China, the Straits, the Far East, also in Bombay, Calcutta, Colombo, New York, San Francisco, and Lyons. The London offices are at 9, Gracechurch St., E.C., and the paid-up capital is 20,000,000 H.K. dollars.

Honi soit qui mal y pense (O.F., Shame be to him who thinks evil). Motto of the most noble order of the Garter (*q.v.*).

According to tradition, the words were uttered by Edward III when he picked up a garter accidentally dropped at a court ball by the countess of Salisbury, and buckled it below his own knee, subsequently instituting the order. This motto is embroidered in gold on the garter badge of the order, which surrounds the coat of arms of the British sovereign.

Honister Pass. Road in Cumberland, England, connecting Sealtoller in Borrowdale (E.) with Buttermere (W.). Rising for 1½ m. to an alt. of 1,190 ft., it is flanked by Honister Crag, 1,750 ft., whose face is scarred by slate quarrying. The forbidding grandeur of this place is described in Hugh Walpole's novel, *Rogue Herries*.

Honiton. Bor. and market town of Devon, England. It stands near the Otter, 16 m. E.N.E. of Exeter. The wide main street is of Roman origin. Since the reign of Elizabeth I, Honiton has been celebrated for lace-making, an industry introduced by the Flemings; there are also light engineering and pottery works and a cattle market. Honiton, which gives its name to a co. constituency, is also a centre of administration for E. Devon. A 3-days' fair, dating back to 1221, is held on the feast of S. Margaret, July 20. Market days, Tues. and Sat. Pop. (1951) 4,613.

Honolulu. City, seaport, and capital of the U.S. territory of Hawaii, in the Pacific, centre of the trans-Pacific routes. On the S. coast of Oahu Island, it is a modern city with electric lighting and tramways and well planned thoroughfares lined with tropical



Honolulu. Air view of the capital of Hawaii; in the distance is Diamond Head, an extinct volcano, with the famous Waikiki Beach at its base

fruit trees and ablaze with bougainvillea and hibiscus. A rly. extends N. round the greater part of the island coast. The city contains good hotels and clubs; Waikiki beach is visited by holiday-makers from all over the world. The climate is both healthy and temperate. The see of an Anglican and an R.C. bishopric, Honolulu is the seat of the university of Hawaii; other buildings include the former royal palace, the government building, and the Bishop museum. There is a good natural harbour, and the airport is a staging point for air liners bound for N. and S. America, Asia, and Australia.

Honolulu has factories for machinery and a small ship-building industry. Seven miles S.W. is Pearl Harbour (*q.v.*); during the Japanese raid on Dec. 7, 1941, Honolulu was also bombed. The military post of Schofield Barracks is 20 m. W., and the headquarters of the U.S. army in Hawaii is near by. An unpretentious village until its fortification in 1815, the city and co. of Honolulu were formed from the co. of Oahu in 1909, being then granted municipal rights. Estimated pop., 261,023, with a majority of Polynesians, Chinese, and Japanese.

Honorary Rank. Rank in the army which confers no advantages as regards pay, retirement, or pension. Up to 1918 it was granted to quartermasters and similar officers in the army while serving. During the Great Wars civilians were given honorary service rank while attached to formations for the performance of special services. Officers when demobilised were usually granted an honorary rank and could use it in civilian life if they wished.

Honorius. Sister of Valentinian III, Western Roman emperor 425-455. When Attila, the Hun, was threatening to overrun the empire, she sent him an offer of marriage. Attila expressed his willingness to accept the proposal, but demanded half of the western empire as her dowry. The refusal of this demand led to the crossing of the Rhine with a large force. *See* Attila.

Honorius, FLAVIUS. Roman emperor of the West, 395-423. He was the second son of Theodosius the Great and brother of Arcadius, emperor of the East. He was placed by the terms of his father's will under the guardianship of the Vandal Stilicho, whose daughter Maria he married. During the reign of Honorius dismemberment of the empire by the barbarians

made rapid progress. Britain secured virtual independence, the Vandals settled in Spain, while



Honorius, Roman emperor
From a coin

Gaul was occupied by the Visigoths, Franks, and Burgundians. While his distinguished general Stilicho was alive they were kept at bay by fighting or by negotiation, but after Stilicho had been put to death in 408, as the result of an intrigue against him, in 410 Alaric, king of the Visigoths, took and sacked Rome, 800 years after it had been taken and sacked by the Gauls. After the death of Stilicho, Honorius found another capable general in the person of Constantius, who became the colleague of the emperor and in 417 married his sister Placidia, being afterwards proclaimed joint-emperor. Honorius, who was quite unfitted to rule, spent most of his time in poultry-breeding in the marshes of Ravenna, where he died Aug. 27, 423.

Honorius. Name of four popes, of whom two are noticed separately. Honorius II, pope 1124-30, was an archdeacon of Bologna and cardinal. His election was forcibly demanded by the Frangipani family. While holding the office of cardinal-bishop of Ostia, he concluded the concordat of Worms, 1122, with Henry V. Honorius IV belonged to the noble Roman family of Savelli. He was 75 when elected pope in 1285, and died two years later.

Honorius I (d. 638). Pope 625-638. A native of the Campagna and a monk, he was consecrated pope in succession to Boniface V. He was notable for his condemnation as a heretic by the sixth general council (Constantinople, 680-681), which put an end to the Monothelite heresy and anathematised its adherents. Sergius, patriarch of Constantinople, condemned by the same council, had referred the controversy to the pope for guidance. Honorius refrained in his answer from making any dogmatic assertion, but advocated rather a policy of caution. His heresy consisted in evading the duty of declaring the faith of the Church.

The question of this condemnation of a pope for heresy was raised at the time of the Vatican Council (1870) which promulgated the decree of Papal Infallibility;

the difficulty was met by the agreement that the pope's letter did not constitute an *ex cathedra* utterance, which alone is the subject matter of infallible judgment. It was by this pope's advice that S. Birinus evangelised the kingdom of the W. Saxons, and the Irish bishops, in 630, adopted the Roman use in the time of keeping Easter.

Honorius III (d. 1227). Pope 1216-27. His name was Cencio Savelli, and he was born at Rome. After being a canon and papal chamberlain, 1188, he was made a cardinal in 1193, and in 1197 was appointed tutor to the young king Frederick II. He ascended the papal throne in 1216 and the rupture between the Papacy and the Empire was staved off during his lifetime. Honorius was zealous for the spiritual reform of Europe and the recovery of Jerusalem, but the policy of Frederick II wrecked the Fifth Crusade, furthered with all the means in his power by the pope.

In England, Honorius championed the infant Henry III against the barons who would have deprived him of the crown, and throughout the boy-king's minority the pope's influence was maintained through his legates. In face of a rebellion he was forced to retire from Rome in 1219, and again in 1225, owing to the quarrel between the Conti and Savelli families. Honorius was an ardent supporter of the new religious orders springing up, and issued Bulls approving the Dominicans, 1216, the Franciscans, 1223, and the Carmelite Order, 1226. Among other saints he canonised S. Hugh of Lincoln. Distinguished for personal learning, he left behind literary remains of considerable interest and importance, and it was by his order that the collection of decretals known as the *Compilatio Quinta* was drawn up. He died at Rome, March 18, 1227.

Honor Oak. Residential dist. and park in the S.E. suburbs of London. It is in the metropolitan borough of Lewisham, and has two rly. stations. It is 6 m. S.S.E. of London Bridge. Known also as Oak of Honour Hill and One Tree Hill, the height here (300 ft.) is perhaps named from an oak under which Queen Elizabeth is said to have dined. The old ceremony of beating the bounds used to be observed here. The hill, once employed as a beacon and semaphore station, became public property in 1905.

Honour. Name given in the Middle Ages to a large estate held

by one lord. It consisted of two or more manors, which, however, retained their separate organizations. It did not, like a barony or an earldom, give its owner a specific title; he was known merely as the lord of the honour, and the grant of honours by the kings was not very frequent. One of the largest and most famous honours in England was that of Clare. See Feudalism; Manor.

Honourable. Title of honour. In the U.K. it is applied to the younger sons of earls and to the children of viscounts, barons, and life peers, to maids of honour, the lord provost of Glasgow, justices of the high court except lords justices and lords of appeal, members of the house of commons collectively and individually, to some colonial officials, and to the Honourable Artillery Company, the Inns of Court, and the Irish Society. Earls, viscounts, barons, privy councillors, lord mayors, the lord provost of Edinburgh, lords justices, and lords of appeal are "right honourable." Marquesses, and the privy council and the Order of the Bath collectively, are "most honourable." In Australia, Canada, and other parts of the Commonwealth the prefix honourable is borne, during their term of office, by members of the legislatures and judges, as well as by ministers of the crown. In the U.S.A. "honourable" is applied to members of congress and state legislatures, judges, etc.

Honourable Artillery Company. British regiment. It dates from 1537, when Henry VIII gave



Honourable
Artillery Com-
pany arms

some of London's citizens, called the Fraternity or Guild of Artillery, a charter directing them to encourage the "science and feat of shooting long bowes, cross-bowes and handgonnes for the better defence of the realm." In 1641 the company obtained the training ground near Bunhill Fields, which it still holds. In that year the prince of Wales (afterwards Charles II) joined it, and since then either the king or prince of Wales has almost always held command of the company as Captain-General.

Artillery (in the modern sense) was not added until 1781. Four H.A.C. members who emigrated founded in 1638 the Ancient and Honourable Artillery Company of

Massachusetts, with headquarters at Boston. This is the oldest surviving military body in the New World.

In the S. African War, the regiment provided all the officers and 90 p.c. of other ranks for the City



Honourable
Artillery Com-
pany badge

Great War—in France, Egypt, Aden, Palestine, and Italy. The battle honours included Ypres, 1915, '17; Somme, 1916, '18; Ancre, 1916; Arras, 1917, '18; Bullecourt; Passchendaele; France and Flanders, 1914–18; Vittorio Veneto; Gaza; Jerusalem.

As part of the Territorial Army, the regiment built up a large reserve of trained infantrymen and gunners, most of its members being drawn from the City of London. On the outbreak of the Second Great War, the infantry battalion became an O.C.T.U. The R.H.A. batteries were soon expanded to form two complete regiments—11th and 12th; later the 13th regiment was added. Between them, these units fought in Libya, Tunisia, Sicily, Italy, Normandy, and N. W. Europe. The guns of the 11th H.A.C., landed at Pachino, Sicily, on July 10, 1943, were the first British artillery to go into action in the Allied invasion of Europe from N. Africa. The 86th Heavy A.A. Regiment, formed in 1939, played a great part in home defence and later in France and Belgium. It landed in Normandy on D-day, and defended Antwerp against flying bombs. Other H.A.C. units were a national defence company and a cadet battalion.

Among the privileges of the H.A.C. are the wearing of similar dress uniform to that of the Grenadier Guards (the gold lace being replaced by silver); the provision of a guard of honour when royalty visits the City, and the right to march through the streets of the City "with bayonets fixed, colours flying, and drums beating." In 1938, following the fourth centenary celebrations, the H.A.C. was selected to mount the first guard by a non-regular unit

at Buckingham Palace. The headquarters are at Armoury House, City Road, E.C.1. The building dates from 1735, and contains regimental relics. Consult History of the Honourable Artillery Company, G. Goold Walker, 1926.

Honshu or **HONDO.** Largest island of Japan, known also as Mainland. It is separated from Hokkaido on the N. by the Tsugaru Strait, and from Shikoku and Kyushu on the S. by the Inland Sea, and has a coast-line of over 4,700 m. Including 382 adjacent small islands, its area is 88,919 sq. m. It is crescent-shaped and about 800 m. in length from N.E. to S.W., while its maximum breadth is c. 250 m. Its shores are broken by numerous bays, and in the S. it is fringed by numerous islands. The chief inlets are Rikuuoku bay in the N., Toyama and Wakasa bays on the W., and Owari, Suruga, and Tokyo bays on the E.

The mountains belong to three systems. In the centre the Fuji group crosses the island from E. to W., this section being variously known as the Japanese Alps or the Sierra Nevada of Japan. Many of the peaks are volcanic in origin. Fuji itself is probably the most perfect volcanic cone in the world; Oshima is still active, and there are traces of former glaciers. In the N., in the Kwanto district, comparatively low and rounded peaks stretch in undulations as part of the Sakhalien mt. system; in the S., in Kwansai, higher and more rugged peaks connect with those of Korea and Central Asia.

In the S. part of the island is the celebrated lake of Biwa, an object of superstitious awe; other lakes are Shinji in the S.W., Inawashiro in the centre, and Towado in the N. The numerous rivers are all short, and rarely navigable far inland. Earthquakes are prevalent, and often destructive, as in 1923. Towards the close of the summer typhoons frequently occur. The climate is on the average warmer than that of England, with twice its annual range of temperature. There is a definite rainy season at midsummer, and much snow during the winter. Rainfall is so heavy that there is little grass land, the natural vegetation being forest. The island is the most densely populated in the country.

The capital is Tokyo; other large towns and ports are Yokohama, Kyoto, Hiroshima, Kobe, Osaka, and Nagoya. Exports in the 1930s were rice, silk, tea, barley, rye, matting, oil, lacquered ware,

earthenware, paper, and coal. The minerals include gold, silver, copper, lead, and iron. Fishing is engaged in on the coasts, and salmon and trout may be caught in fresh-water lakes and streams. In the forests are oak, beech, maple, elm, pine, and cedar. Various fruits are cultivated, the cherry and plum mainly for their blossoms.

Honthorst, GERARD VAN (1590–1656). Dutch painter. Born at Utrecht, Nov. 4, 1590, he studied



Gerard van Honthorst,
Dutch painter
Self-portrait

under Abraham Bloemaert, and at Rome. On his return to Utrecht he opened a successful school, and later was invited by Charles I to decorate Whitehall with allegorical paintings.

Besides carrying out decorations at The Hague and Ryswick, he received important commissions from the kings of Denmark and Prussia. His earlier work was largely inspired by Caravaggio. In his last years he virtually confined himself to portraiture. He died at Utrecht, April 27, 1656. See Craven, Earl of, illus.

Hooch, PIETER DE (c. 1632–81). Dutch painter. Born at Rotterdam, he appears to have spent part of his life at Delft, and the rest at Amsterdam and Haarlem. He knew Nicholas Berchem (*q.v.*) at Delft, and possibly worked under him. De Hooch is outstanding among the Dutch painters of everyday scenes in houses and courtyards. His composition and drawing are masterly, his treatment of detail unusually thorough, and his colour cool, luminous, and brilliantly luxurious. There are fine examples of his art in the National Gallery, London, the Wallace Collection, London,

and the Rijks Museum, Amsterdam. He died at Haarlem.

Hood (A.S. *hōd*; cf. Eng. hat). Originally a covering for the head, but now mainly an addition to an academic robe. In England in the Middle Ages it was worn by men and women, rich and poor alike, until in the 15th century its place was taken by the hat. The commonest form of hood fitted close about the head, neck, and shoulders. This had a tippet or liripipe hanging at the back, which remained a factor in head-dress after the hood itself had been discarded. Vestiges of this survive in ceremonial dress, while hoods are often worn by women and children in wet weather. In falconry a hood was used to cover the eyes of the hawk, and from this we have the word hoodwink.

As an addition to an academic robe, the hood indicates the academic rank of the wearer. By the 58th canon every minister when officiating in church, if a graduate, is required to wear over his surplice the hood proper to his degree. Receivers of Lambeth degrees wear the hood of such degrees as are worn at the university of the archbishop who gives them. Distinctive hoods have been adopted also by various theological colleges. The Oxford shape is an enlarged cowl; the Cambridge includes a cowl upon the tippet. Examples of university hoods are

Oxford.—B.A., black silk, lined white fur; M.A., black silk, lined crimson; B.D., black silk, plain; D.C.L., scarlet cloth, lined pink silk; D.Mus., white brocaded silk, lined crimson silk; D.D., scarlet cloth, lined black silk; D.Litt. and D.Sc., scarlet cloth, lined neutral grey silk; D.Phil., scarlet cloth, lined dark blue silk; M.Ch., black silk, lined light blue silk.

Cambridge.—B.A., black silk, trimmed white fur; M.A., black silk, lined white silk; B.D., black silk; D.D., scarlet cloth, lined pink and violet shot silk; LL.D., scarlet cloth, lined light cherry-coloured silk; Mus. D., damasked cream white silk, lined dark, cherry-coloured satin.

London.—B.A., black silk or stuff, edged russet-brown silk; LL.B., black silk or stuff, edged blue silk; M.A., black corded silk, lined russet-brown silk; M.Sc., black corded silk, lined gold silk; M.D., scarlet cloth, lined purple silk; D.Mus., scarlet cloth, lined white watered silk; D.Sc., scarlet cloth, lined gold silk; D.D., scarlet cloth, lined sarum red silk.

Durham.—B.A. black stuff, bound with white fur; M.A., black silk, lined purple; B.D., black silk.

Edinburgh.—M.A., black silk, lined white silk; B.D., black silk, lined purple silk, bordered with white fur; D.D., black cloth, lined purple silk; Mus. D., scarlet cloth, lined white corded silk.

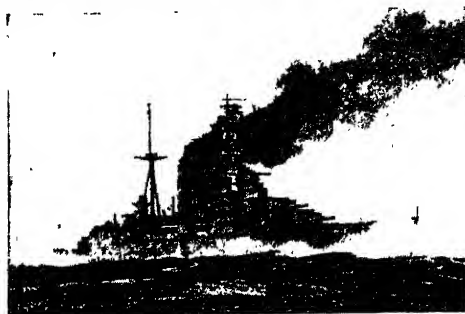
See Degree; Gown, colour plate.

Hood. British battle cruiser sunk on May 24, 1941, by the German battleship Bismarck (*q.v.*). Completed in 1920, the Hood displaced 42,100 tons on a length of 860 ft. 7 ins., a beam of 105 ft. 2 ins., and a draught of 31 ft. 6 ins. Her engines developed 144,000 s.h.p. to give a maximum speed of 31 knots. Main armament consisted of eight 15-in. guns and there were secondary batteries of twelve 5.5-in. and eight 4-in. A.A. guns. The Hood cost £6,025,000 and was for many years the largest and most powerful warship in the world. She was extensively refitted in 1929–30, when much additional armour was worked into the hull and the A.A. armament was increased, raising the tonnage to 46,300.

At the outbreak of the Second Great War, the Hood was flagship of the battle cruiser squadron, Atlantic Fleet. On July 3, 1940, she took part in the action against French ships at Oran, and on July 9 carried out an offensive sweep in the Mediterranean with the Ark Royal (*q.v.*). When the German battleship Bismarck and heavy cruiser Prinz Eugen sailed from Bergen as commerce raiders the Hood and the battleship Prince of Wales were detailed to intercept them. Contact was made off the coast of Greenland on May 24, 1941, and after an exchange of fire the Bismarck scored a direct hit on the Hood's main magazine. A colossal explosion tore the ship to shreds, and she went down in a



Hooch. Typical interior by the Dutch painter Pieter de Hooch, a masterpiece now to be seen in the Wallace Collection, London



H.M.S. Hood. British battle cruiser, completed in 1920 and sunk by the German battleship Bismark, May 24, 1941

few minutes. There were fewer than a dozen survivors from her crew of 1,418. German documents captured later revealed that the Hood had been picked up by the German equivalent of radar and sunk at a range of 13 m.

Hood. Summit of the Cascade Mts., Oregon, U.S.A. It is situated 50 m. E. of Portland, and is an almost extinct volcano, 11,225 ft. high, exhibiting feeble signs of its former activity. In 1907 a fumeroles melted much glacier ice.

Hood, SAMUEL, 1st VISCOUNT (1724-1816). British sailor. Born Dec. 12, 1724, he entered the navy

in 1741. After seeing service in America and off the coast of Spain, in 1759 he commanded the Vestal frigate under Rodney in the blockade of the French coast, and was afterwards

dispatched to the Mediterranean. In 1767 he was commander-in-chief in N. America, where he remained until 1771. Commissioner of Portsmouth and governor of the naval academy, he was made a baronet in 1778, became rear-admiral in 1780, and was dispatched in command of a squadron to the W. Indies to reinforce Rodney. After several minor engagements with the French he sailed for N. America, where he vainly attempted to prevent the French admiral, De Grasse, from blockading the Chesapeake, 1781.

Having returned to the W. Indies, Hood made a vain attempt to eject the French from St. Kitts. Serving with Rodney, he took part in the victorious action off Dominica, April 9 and 12, 1782. Made an Irish baron on his return, Sept. 12, 1782, he was M.P. for Westminster in 1784, commander-in-chief

Hospital, holding the post until his death, Jan. 27, 1816.

Hood, BASIL WILLETT CHARLES (1864-1917). British dramatist. Born April 5, 1864, he was educated at Wellington and Sandhurst and was in the army 1883-98. He wrote much for the stage, chiefly light comedies and the librettos for musical plays, e.g. *The Rose of Persia*, 1900; *Merric England*, 1902; *A Princess of Kensington*, 1903; *The Merry Widow*, 1907; and *The Dollar Princess*, 1909, the last two being adaptations. He died Sept. 7, 1917.

Hood, SIR SAMUEL (1762-1814). British sailor. Born Nov. 27, 1762, of a naval family, he entered the service in 1776, and fought at the battle off Ushant, 1778. In 1780 he sailed to the W. Indies under his cousin, the future Lord Hood, was promoted lieutenant, and fought in actions off Martinique and Cape Henry, St. Kitts and Dominica. In 1790 he took the frigate Juno to Jamaica, where he saved three men from a wreck. In 1793 he served in the Mediterranean under Lord Hood, and in 1795 was in command of a small squadron off Smyrna.

Transferred to the *Zealous* in 1797, Hood was under Nelson at Santa Cruz and the Nile, 1798,

being afterwards left in command of the squadron blockading the French army in Egypt. In 1801 he transferred to the *Venerable*, and was present at the action of Algeiras and Gibraltar. As commander-in-chief of the Leeward Islands, 1802, he distinguished himself in actions against French cruisers. In 1804 he was knighted, and, returning to Europe, engaged

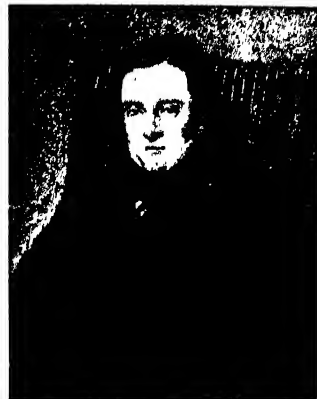


Sir Samuel Hood, British sailor After a miniature

at Portsmouth, 1787-88, and commander-in-chief in the Mediterranean in 1793, when he blockaded Toulon and reduced Bastia, 1794. Promoted admiral the same year, he returned to England, in 1796 was made a viscount, and was appointed governor of Greenwich

a French squadron off Rochefort, capturing four large frigates. In 1807 he became rear-admiral and served in the Baltic. In 1809 he was made a baronet, in 1811 vice-admiral, and in 1812 commander-in-chief of the East Indies. He died at Madras, Dec. 24, 1814.

Hood, THOMAS (1790-1845). British poet. Born in London, May 23, 1799, of Scottish descent, he entered a city office at 13. Being threatened with consumption, he was sent to live with relatives in Dundee, where he began to contribute to the local press. Returning to London in 1818, he learnt the art of engraving, but gave it up in 1821 for a post on *The London Magazine*, in which capacity he came in contact with De Quincey, Hazlitt, and Lamb. His first publication to attract notice was *Odes and Addresses to Great People*, 1825, issued in conjunction with J. H. Reynolds, whose sister he married.



Thomas Hood, British poet. From the painting by an unknown hand in the National Portrait Gallery

The two series of *Whims and Oddities* appeared in 1826 and 1827. In 1829 Hood became editor of an annual called *The Gem*, in which was published his own *Dream of Eugene Aram*. The *Gem* was followed in 1830 by *The Comic Annual*. In 1834, owing to financial disaster, Hood with his family removed first to Coblenz, and then to Ostend, with a view to living economically, and in due course paying his creditors in full. In 1840 he returned to England and became editor of *The New Monthly Magazine*, and then of Hood's *Magazine*, a venture of his own. But by 1844 his health had completely broken down, and he died May 3, 1845.

As a poet Hood is not usually profound. But *The Song of the*

Shirt, contributed to *Punch Almanack* in 1843, was a moving poem that drew public attention to the sweated labour of sempstresses; *The Bridge of Sighs* has noble simplicity and compassion; the *Ode to Autumn* may be compared with Keats's. As a humorist Hood's chief characteristic was his Cockney partiality for the sardonic. He is at his best in pieces like *Miss Kilmansegg*, wherein the serious and comic are blended. An astonishing punster, who remarked after a rough Channel crossing, "A sick transit has destroyed the glory o' Monday," he indulged this facility in such ballads as *Ben Battle*, and *Faithless Nelly Craig*. But he could also make the memorable and quotable phrase which has endeared Eugene Aram, *The Death-bed*, and *I Remember, I Remember*, to so many readers. An edition of his poems was made by Alfred Ainger, 1897. *Consult* *Life and Times*, W. Jerrold, 1909; T. H. and Charles Lamb, W. Jerrold, 1930.

Hood, Tom (1835-74). British humorist, the only surviving son of Thomas Hood. Born at Wanstead, Essex, Jan. 19, 1835, he was baptized Tom, and educated at Pembroke College, Oxford. Destined originally for the Church, and for a time in the War office, he took to journalism, and in 1865 he became editor of *Fun*, to which he contributed jokes, verse, and caricatures. Tom Hood's *Comic Annual* began in 1867. He also wrote novels, of which the best is *Captain Masters's Children*, 1865. He died Nov. 20, 1874.

Hoof. Horny covering of the tips of the toes in the ungulate mammals. It corresponds to the claw in other families of the vertebrates—the human nail representing the outermost component of the primitive claw. The hoof grows constantly, and if not worn away by walking and climbing tends to become enlarged and distorted.

Hooft, Pieter Corneliszoon (1581-1647). Dutch historian and dramatist. Born at Amsterdam, March 16, 1581, the son of a Dutch merchant prince, he travelled extensively in France, Germany, and Italy, and studied law at Leyden. The castle of Muiden,

of which he was appointed steward in 1609, became the centre of all the writers, artists, and scholars of the golden age of Dutch literature, and there he created the *Muiden Circle*. He ranks among the first of Dutch prose writers. His letters, full of charm, are a valuable contribution to a knowledge of the period. His plays include the pastoral *Granida*, 1615, and the tragedy *Theseus en Ariadne*, 1614, while of his historical writings, *De Nederlandsche Historien*, 1642, is considered a classic. Hooft died at The Hague, May 21, 1647.

Hooze. Village of Belgium, in the prov. of W. Flanders, which figured prominently in the fighting of the First Great War. On the Ypres-Menin road, 3 m. E. of Ypres, it was Gen. French's headquarters during the 1st battle of Ypres. The Germans captured the village in May, 1915, and it figured in local British attacks during the following months. This fighting was marked by the constant use of gas by the Germans, a form of attack against which the British gas masks of that date were an inadequate protection. In this sector, too, the Germans used flame-throwers for the first time against British troops (July 30, 1915) with considerable success, but early in August the British retook all ground lost at the expense of 2,000 casualties. There was further hard fighting in June, 1916, when the Germans attacked the Canadian line S. of Hooze, which was held at the cost of 7,000 casualties in ten days of fierce fighting. The ruins of Hooze were reoccupied by the British on July 31, 1917, and the region finally cleared in September, 1918. *See* Ypres, Battles of.

Hooghli. Western arm of the Ganges delta, India. It is the most important channel by which that river flows into the Bay of Bengal. It is tidal as far as Calcutta, and its chief tributary is the Damodar, rising in the hills of Chota Nagpur. *See* Calcutta.

Hooghli. Dist. and town of India, in Bardwan div. of West Bengal. About half the dist. (area 1,212 sq. m.) is under cultivation, rice being the chief crop.



Pieter Hooft,
Dutch author
From a print

It is also important industrially, exports including rice, cotton cloth, and gunny bags; imports include piece goods and salt. Pop. (1951) 1,554,320.

Chandernagore, formerly French (pop., 1951, 49,909), was in 1952 incorporated in Hooghli dist.

The British East India co. founded a trading station at Hooghli town, on the Hooghli r., in 1640, moved 50 years later to Calcutta 25 m. S. down river. The importance of Hooghli declined after 1875. With Chinsura, capital of Hooghli dist., it forms a municipality, pop. (1951) 56,805.

Hook. Word used generally for a piece of metal bent into a curve, or at an angle, for catching or holding anything. Usually it is qualified to indicate its particular use, e.g. coupling hook, fish hook. In agriculture a hook is a cutting implement usually with a short wooden handle.

The word is used in the sense of driving a ball off a straight course in golf and cricket; and for the sharp bend or curve in a stream or land, as in Sandy Hook.

Hook, Captain James. Pirate chief in Barrie's fairy story and play, *Peter Pan* (q.v.). With a hook for a hand, he terrifies his own crew as well as the boys of the Never-Never Land, but is himself scared by a crocodile, which pursues and in the end swallows him. Hook's last words are the motto of Eton College, *Floreat Etona*. The part has been played with zest by such famous actors as Ainley, Du Maurier, and Charles Laughton.

Hook, Theodore Edward (1788-1841). British wit, novelist, and dramatist. Born in London, Sept. 22, 1788, he was educated at Harrow and at Oxford. Before going to Oxford he had written farces and melodramas, be-



Theodore E. Hook

come known as a man about town, and in 1809 had perpetrated the famous Berners Street hoax, as a result of which that thoroughfare was congested for a whole day by all classes of society, from the duke of Gloucester and the lord mayor to tradesmen and sweeps, who thronged to the house of a lady against whom Hook had a grudge, in response to his bogus invitations and orders of various kinds. He received in 1813, through social

influence, the appointment of treasurer of Mauritius. In 1817 investigation revealed a deficiency of 62,000 dollars (£12,500). The home authorities absolved Hook from criminal proceedings, but held him responsible, and what property he had was seized and he was imprisoned, 1823-25.

Hook never attempted to pay off the remainder of the liability, though he earned large sums by his pen. In 1820 he had started *John Bull*, a Tory journal which, conducted with astonishing vigour, overflowing wit, and incredible scurrility, brought him a substantial income. Nine volumes of novels, *Sayings and Doings*, appeared in 1826-29. His other novels include *Maxwell*, 1830, perhaps his best; *Jack Brag*, 1837; *Births, Deaths, and Marriages* 1839. He died at Fulham, Aug. 24, 1841. Hook was a man whose powers of improvisation were extraordinary. His *Life* was written by R. H. D. Barham. 1849, rev. ed. 1899.

Hook, WALTER FARQUHAR (1798-1875). British divine. Born in London, March 13, 1798, he was the nephew of Theodore Hook. Educated at Winchester and Christ Church, Oxford, he was ordained a n d was a curate at Whippingham, Isle of Wight. During 1828-37 he held a living at Coventry, and then was made vicar of Leeds. His immense parish was divided and many new churches built, but more remarkable was the hold the church obtained over the people and the expansion of its influence, due in large measure to the vicar's energy and oratorical ability. Some of his sermons and addresses won a national reputation, and he was long regarded as the model of what a parish priest in a large town should be. In 1859 he was made dean of Chichester, where he wrote *Lives of the Archbishops of Canterbury*, 12 vols., 1860-76. He died Oct. 20, 1875. *Consult* *Life and Letters of Dean Hook*, W. R. W. Stephens, 1878.

Hookah (Arab. *huqqah*, vase, bottle). Oriental water tobacco-pipe. Its chief essential feature is a vase containing water, sometimes scented, through which the smoke is passed and cooled. The smoke is drawn from the bowl through a tube into the water, and



Hookah as used in Turkey, showing the long tube through which the smoke passes

thence by a long flexible tube into the mouth of the smoker. The *nargileh* of Persia and the Indian *hubble-bubble*, so called from the noise made by the smoke on passing through the water, are similar in principle. Hookahs are made of porcelain, glass, or metal, etc., and are often richly decorated.

Hooke, ROBERT (1635-1703). English scientist. Born at Freshwater, I.O.W. July 18, 1635, he was educated at Westminster and Christ Church, Oxford. He became professor of geometry at Gresham College, 1665, and permanent secretary of the Royal Society, 1677. He invented the anchor escapement in clocks and used spiral springs in watches; improved the microscope and thermometer; and may have anticipated Newton's law of gravitation and Huygens' pendulum. He died March 3, 1703. *See* *Hooke's Law*.

Hooker, Peak of the Canadian Rockies on the Alberta and British Columbia boundary, near lat. 52° 25' N., rising to an alt. of 10,500 ft. Coal and petroleum are found in the neighbourhood.

Hooker, JOSEPH (1814-79). American soldier. Born at Hadley, Massachusetts. Nov. 13, 1814, he was educated at the military academy at West Point. He served in the Mexican War (1846-48), and after the outbreak of the Civil War was appointed to the command of a Federal division.

He succeeded Burnside, in the leadership of the army of the Potomac in Jan., 1863, but he was a fighting general (his nickname was Fighting Joe) rather than a leader, and lost the battle of Chancellors-

ville. Though he strenuously resisted Lee's second advance, and later did good service at Lookout Mountain, and the siege of Atlanta, he had lost the confidence of his superiors and retired from active service. He died at Garden City, New York, Oct. 31, 1879.

Hooker, SIR JOSEPH DALTON (1817-1911). A British scientist. Born at Halesworth, Suffolk, June 30, 1817, he took a medical degree at Glasgow in 1839. In the same year he accompanied Sir James Ross's Antarctic expedition in the *Erebus*, publishing on his



Sir Joseph Hooker, British scientist

return an account of the flora of the south temperate and sub-Antarctic regions. In 1848 he led a botanical expedition to N. India, and in 1855 was appointed assistant director at Kew Gardens. It was there that in 1862 the first part of *Genera Plantarum* was prepared. Three years later, his father having died, he succeeded him as director of Kew. In 1872-77 he was president of the Royal Society, being knighted in the latter year. In 1885 he retired from Kew, but continued his botanical work. He was awarded the O.M. in 1907. Hooker died Dec. 10, 1911.

Hooker, RICHARD (c. 1553-1600). English theologian. Born at Heavitree, a suburb of Exeter, he was educated at Exeter and at Corpus Christi College, Oxford, and, vacating his fellowship on his marriage, was rector of Drayton Beauchamp, Bucks, 1584-



Richard Hooker, English theologian
After Hollar

85, and then Master of the Temple. There his advocacy of Anglicanism against the Calvinism of the afternoon reader Walter Travers, a discussion conducted on lines of mutual respect, inspired his *Treatise on the Laws of Ecclesiastical Polity*, 1594, the earliest important work of the kind in English.

This work, which was continued while Hooker was rector of Boscombe, Wilts, and Bishopsbourne, Kent, was designed to fill eight books, only five of which were printed in the author's lifetime.



Walter F. Hook, British divine

Book six, as we have it, is of dubious authority: and books seven and eight are probably revisions of Hooker's MS. Praised by Hallam for the stateliness and grace of its language, and winning for its author the epithet "judicious," the Ecclesiastical Polity was written to supply a philosophical and logical basis for the English Church as established at the Reformation. The treatise is a masterpiece of logical argument and a classic in respect of the beauty of its English prose. The best edition is that of Keble, revised by Dean Church and Canon Paget, 1888, including Izaak Walton's Life of Hooker. Working almost to the last. Hooker died at Bishopsbourne, Nov. 2, 1600.

Hooker, SIR WILLIAM JACKSON (1785-1865). A British botanist. Born at Norwich, July 6, 1785,



from early youth he was an ardent naturalist. At the age of 35 he had already produced four important works, which included British Jungfermanniae, 1816; Muscologia Britannica (with T. Taylor), 1818; Musci Exotici, 1818-20. In 1819 he was elected prof. of botany at Glasgow, and organized the new botanic garden at Sandyford. In 1841 Kew was nationalised, and Sir William, who had been knighted five years earlier, was appointed director.

Hooker did a vast amount of literary work, often in collaboration with others, in addition to his British Flora and several important works on ferns, editing The Botanical Magazine and Hooker's Journal of Botany. He died at Kew, Aug. 12, 1865.

Hooke's Law. Statement first made in 1676 by Robert Hooke (q.v.), of value in the study of metals. He studied the theory of elasticity and stated, in effect, that the stretching of a material depends upon the load applied: i.e. strain is proportional to stress.

Hook of Holland (Dutch Hoek van Holland, corner of Holland). Point and village of the Netherlands, in S. Holland. The village stands at the entrance of the Nieuwe Waterweg, a waterway constructed 1866-90, the shortest route between the North Sea and Rotterdam. There is a landing stage for steamers with a rly. station near by. The passage by steamer from

Harwich (Parkeston Quay), 120 m., to the Hook takes normally about seven hours, and trains to Rotterdam and Amsterdam run in connexion with the boats. The village is insignificant.

Following the German invasion of the Netherlands on May 10, 1940, British destroyers were ordered to the Hook of Holland. Marines were later landed to hold the port while Queen Wilhelmina was taken off in a destroyer. On May 13 the British forces withdrew after carrying out extensive demolition of the docks and harbour installations. Towards the end of the German occupation rocket bomb sites were established in the vicinity of the Hook of Holland.

Hookworm. Parasite of which two species may affect man. Faeces containing ova are deposited on moist earth, and these ova on contact with the human skin find their way via the oesophagus and stomach to the small intestine, causing haemorrhage and subsequent anaemia. No drug is completely efficacious in getting rid of the parasite. See Ankylostomiasis.

Hooley, ERNEST TERAH (1859-1947). British financier. Born at Long Eaton, Derbyshire, Feb. 5, 1859, he became a stockbroker at 22 and came to London in 1896. By successful deals in company promoting he acquired an immense fortune, at the height of his career commanding over £18,000,000 of capital. His success was brief, for in 1898 he became bankrupt. In 1910 he was convicted of fraud, and in 1922 was sentenced to three years' penal servitude for the same offence. His Confessions appeared in 1925, and he died Feb. 11, 1947.

Hooligan. General term for a street rowdy, especially for one who works with a gang. The word

seems to have been first applied locally c. 1890 to a band of young ruffians who terrorised the Southwark district of London. Their leader was named Hooligan or perhaps Hooley, and the band became known as the hooligans or the "Hooley gang." The term soon spread over Europe, such forms as the Russianised "khuligani" and "hooliganzy" having been met.

Hooper, JOHN (c. 1495-1555). English divine and martyr. Born in Somerset and educated at



John Hooper,
English divine

Oxford, he was for some years a Cistercian monk at Gloucester. Becoming a Protestant he had to quit the country in 1539, but he returned in 1549 and became chaplain

to Protector Somerset and a zealous leader of the reformers. In 1550 Edward VI nominated him bishop of Gloucester, but owing to recalcitrancy on the subject of wearing episcopal vestments he was not consecrated until 1551; in the following year he was given the see of Worcester to hold in commendam jointly with Gloucester. Under Mary he was deposed and, on a charge of heresy, burnt at Gloucester Feb. 9, 1555.

Hoopoe (Fr. *huppe*, Lat. *upupa*, Gr. *epops*). Genus of birds found in Europe, Asia, and Africa. The common hoopoe (*Upupa epops*) is an occasional visitor to Great Britain, where it was formerly plentiful. The size of a thrush, it has sandy brown plumage with black and white



Hoopoe. Specimen of the crested bird
W. S. Berridge, F.Z.S.

bars, a handsome crest of erectile feathers on the head, and a long, curved, black and slender beak. It nests in hollow trees and occasionally in walls. The bird feeds mainly on worms and insects. Its name is onomatopoeic, i.e. like that of the cuckoo it represents the curious call uttered by the bird.

Hoorn. Town of the Netherlands, in the prov. of N. Holland. It lies 25 m. by rly. N. of Amsterdam and was formerly, before the draining of the Zuider Zee, a fishing port. The town has industries in tobacco and timber, and is an



Hoorn, Netherlands. 17th century Weigh House in the town square

important agricultural centre for the district, with markets for dairy produce. A steam tramway runs to Enkhuizen. Pop. 12,000.

Hoorn was the capital of the old county of W. Friesland, and has many beautiful 17th century houses. Among older buildings of note are the Stadhuis, 1613 (restored 1903); the Weigh House, 1609; and the Proostenhuis, 1632, which houses the W. Frisian museum. Hoorn gives its name to Cape Horn, which was first rounded by Willem Schouten (1580-1625), a native of the town. It was also the birthplace of Tasman (q.v.).

Hoosiers. Popular term in the U.S.A. for the inhabitants of Indiana. It was placed on the American literary map in 1871, when Edward Eggleston published *The Hoosier Schoolmaster*, which started the vogue for realistic fiction about the Middle West. Other novelists from Indiana included in the Hoosier School are Lew Wallace and Booth Tarkington, while the Hoosier Poet is J. W. Riley.

Hoover, HERBERT CLARK (b. 1874). American president. The son of a blacksmith, he was born at



Herbert C. Hoover, American statesman

West Branch, Iowa, Aug. 10, 1874, and brought up as a Quaker. Graduating from Stanford university as a mining engineer in 1895, he went to Australia and China before setting up his own world wide organization as an adviser on mining practice. On the outbreak of the First Great War he was appointed chairman of the American relief committee in London and commissioner for relief in Belgium. When his country entered the war he became food administrator, and in 1918 was chairman of the American association for relieving European distress. He was secretary of commerce under Harding and Coolidge, 1921-28, being concerned with the relief of the Russian famine of 1921 and with that of the Mississippi floods in 1927.

A Republican, Hoover stood as "Prosperity" candidate for the presidency in 1928, and was elected by an overwhelming majority. But his term of office coincided with the world economic depression, and after 1930 he had to contend with a Democrat majority in congress. An outstanding event of his presidency was the granting of the

so-called Hoover moratorium on reparations and war debts in 1931. In 1932 he stood again, but was decisively beaten by F. D. Roosevelt. Hoover resumed practice as a mining engineer. In 1945, he returned to public life as chairman of the U.S. famine emergency committee, touring Europe and India in 1946.

Hoover Dam. The principal feature of the Boulder Canyon reclamation project authorised by the United States government in 1928. Completed in 1936, this enormous dam, started during Hoover's presidency and originally called after him (its name was changed to Boulder during 1936-47), cost £24,000,000. Built across the Black Canyon of the Colorado river at the state boundary between Arizona and Nevada, the dam impounds a reservoir 119 m. long and 40 m. wide. The reservoir, called Lake Mead, after Dr. Elwood Mead, commissioner of reclamation during the period of construction, holds ten thousand million gallons of water, and is the largest artificial lake in the world.

The dam, which took five years to construct, rises 726 ft. above the bedrock and raised the level of the Colorado 532 ft. It has a foundation width of 650 ft. and is 45 ft. wide at the top; the length along the crest is 1,244 ft. Altogether, 4,400,000 cu. yds. of material were used in the construction of the dam and the adjacent power-house. The difficulty of getting such a thick mass of concrete to set was overcome by running refrigerating pipes through

the liquid concrete as the dam was built.

Over a million acres of arid land and desert are irrigated by the dam, and an aqueduct 250 m. long carries some of the stored water as far as Southern California. Turbines of 2,000,000 h.p. driven by the waters stored by the dam generate 1,034,800 kilowatts of electricity. Six of the largest transformers in the world, each weighing 186 tons, step down the high voltage currents to limits that are usable.

Hop Aphid (*Phorodon humuli*). Species of plant louse or aphid very destructive to the hop and kept in check only by the regular use of insecticidal sprays. It winters in the egg stage on sloe, bullace, and damson, more rarely on plum.

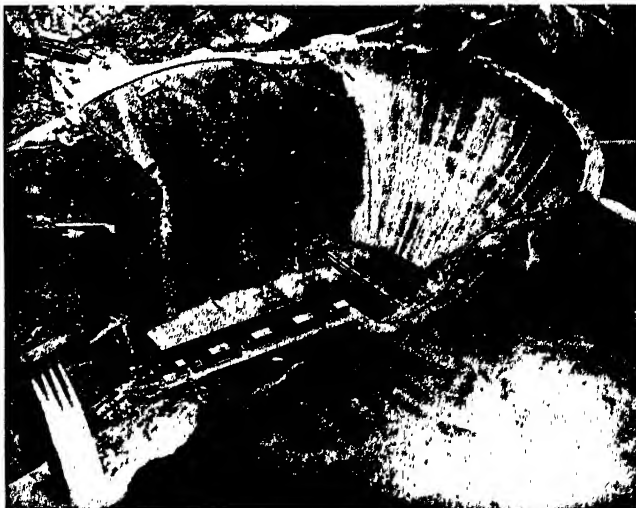
Hope, ANTHONY. Pen-name of Sir Anthony Hope Hawkins (1863-1933), British novelist. Born in



Anthony Hope
H. O. Hopp

London, Feb. 9, 1863, son of the vicar of S. Bride's, Fleet St., he was educated at Marlborough and Balliol College, Oxford. He was called to the bar at the Middle Temple in 1887,

but his main interest was writing fiction. The *Prisoner of Zenda*, 1894, had an immediate success, and was followed by similar stories of love and intrigue in imaginary states of Europe. Another success was the witty social satire, *The*



Hoover Dam, Nevada. Aerial view of this great engineering achievement across the Colorado river, near Las Vegas. It forms behind it a lake 119 m. long

Dolly Dialogues, 1894. There followed *The Indiscretion of the Duchess*, 1894; *Simon Dale*, 1898. *The Intrusions of Peggy*, 1902; *Mrs. Maxon Protests*, 1911; *A Young Man's Year*, 1915; *Little Tiger*, 1925. Knighted in 1918, the author died July 8, 1933.

Hope, JOHN (1725–86). Scottish botanist. Born in Edinburgh, May 10, 1725, he was educated at the university and abroad, and settled as a physician in Edinburgh in 1750. In 1761 he was appointed professor of botany and materia medica at his native city, and king's botanist of Scotland. In 1768 his chair was changed to that of botany and medicine, and eight years later he arranged a medical botanical garden near Leith Walk, where he put into practice the system of classification of his friend Linnaeus, to whom he erected a statue in the garden. He died Nov. 10, 1786.

Hope Diamond. Famous blue diamond, weighing $44\frac{1}{2}$ carats, reputed to bring misfortune to its possessor. At one time the property of the actress wife of Lord Francis Hope, it was originally the eye of a Hindu idol, which legend declares to have placed a curse on it. The diamond was brought from Asia and sold to Louis XIV of France. Its owners have included the tragic queen Marie Antoinette; Sultan Abdul Hamid, who was deposed; and it was sold in 1909 to an American, E. McLean, whose son was killed soon afterwards. Mrs. McLean died in 1947, and it was sold in 1949 to a New York jeweller, H. Winston, for over £250,000.

Hopei. Province of north China formerly called Chihli (direct rule, because ruled direct from Peking under the Manchus). The capital is Paoting; other important cities are Peking, capital of China; Tientsin, the leading port and trading centre of north China; and Chengting. East of Tientsin is Tangku harbour, one of the finest in Asia. Several railways run through Hopei, which borders Jehol on the N., Inner Mongolia on the W., Shansi and Shantung on the S., and the Gulf of Chihli on the E. The principal products are wheat, maize, cotton, leather, coal, and salt; iron ore is exported. Area 55,000 sq. m. Pop. (1953) 35,984,644.

Hopetoun, EARL OF. Scottish title borne by the family of Hope since 1703, and now merged in that of marquess of Linlithgow. The family of Hope is



4th Earl of Hopetoun,
British soldier

Hope of Craighall. James (d. 1661) made his name and fortune by developing the lead mines at Leadhills, Lanarkshire. He, also an eminent lawyer, made Hopetoun his residence. His grandson Charles (1681–1742) was made earl.

James, the 3rd earl (1741–1817), inherited large estates from his kinsman, the marquess of Annandale, and was made a baron of the U.K. in 1809. The 4th earl was the Sir John Hope who made a reputation in the Peninsular War. John, 7th earl, was made marquess of Linlithgow in 1902.

Hopi (peaceful people). Body of N. American Indians inhabiting seven pueblos on three tablelands in N.E. Arizona. Less correctly called Moqui, they speak a Shoshonian dialect, and number perhaps 2,000. Small and muscular, they represent various tribal elements whose culture, based on an ingenious method of flood cultivation of maize, squashes, and beans, has been developed under arid conditions. Their weaving and pottery are excellent. Their snake-dance is in origin a rain-making ceremony.

Hopkins, EDWARD JOHN (1818–1901). British organist and composer. Born in London, June 30, 1818, he became a chorister in the Chapel Royal. Adopting the organ as his instrument, he held several appointments as organist before receiving that of the Temple Church in 1843. He held this post for 55 years, raising the musical service to a high degree of perfection. He retired in 1898 and died Feb. 4, 1901. Hopkins composed anthems, chants, and hymn tunes.

Hopkins, SIR FREDERICK GOWLAND (1861–1947). British biochemist, born at Eastbourne, Sussex, June 20, 1861. After a short period as an insurance clerk, he went to the Royal School of Mines, and later became laboratory assistant to Frankland. In 1888 he joined the medical school at Guy's Hospital, and was elected the first holder of the William Gull research studentship. In 1896 he took over the direction of the Clinical Research Association. At

said to be of French origin. Thomas (d. 1646), having become an eminent lawyer, was made a baronet in 1628, and the baronetcy is still held by his descendant,

Cambridge from 1899 he collaborated with S. W. Cole in isolating and identifying the amino-acid tryptophane, and a readership in chemical physiology was created in Hopkins's favour.

In 1906 he published with W. M. Fletcher an account of the production of lactic acid in muscular activity and its subsequent removal by oxidation; this laid the basis of modern knowledge of carbohydrate metabolism. Next he made the first announcement of the importance of vitamins in diet. He had been elected F.R.S. in 1905; in 1910 he became lecturer in physiological chemistry at Cambridge, where his work on proteins and vitamins earned international reputation, especially on the publication of his *Dynamic Side of Biochemistry*, 1913. He was given the newly created chair of biochemistry. Knighted in 1925, he delivered the inaugural address at the International Physiological Congress in Stockholm in 1927. In 1929 he was awarded the Nobel prize for medicine for his discovery of vitamin D. An original member of the Medical Research Council, Hopkins was president of the Royal Society in 1931 and of the British Association in 1933. He received the O.M. in 1935, and died May 16, 1947.



Sir Frederick
Gowland Hopkins,
British biochemist

Hopkins, GERARD MANLEY (1844–89). British poet. Born at Stratford, Essex, June 11, 1844, he was educated at Highgate School and Balliol College, Oxford, where he became a friend of Robert Bridges. Studying under Pater, he was inspired to join the R.C. church in 1866. A disciple of Pusey and lifelong friend of Newman, in 1868 he entered the Jesuit novitiate, and became select preacher at Farm St., London, Oxford, and Liverpool. In 1884 he accepted the chair of Greek at Dublin University. He died June 8, 1889.

None of his strange and vivid poems was published during his lifetime, but Bridges collected them in 1918. They express in subtle and alliterative imagery, often so condensed as to become crabbed, a search for God and an intense love of nature. Every word is a fragment of a perfect pattern.

Hopkins's literary interest lies in his super-sensitive vocabulary and tortuous experiments in prosody. He was responsible for the fashion of "sprung rhythm," in which stress is counted and not syllables. Not until the 1930s was his work really appreciated. His correspondence with Bridges and R. W. Dixon was edited by C. C. Abbott, 1935. There are *Lives* by G. F. Lahey, 1930; E. Ruggles, 1947. *Consult also* *The Poetry of G.M.H.*, E. E. Phare, 1934.

Hopkins, HARRY LLOYD (1890-1946). American administrator. Born at Sioux City, Iowa, Aug. 17, 1890, he graduated from Grinnell College in 1912, and during 1915-17 was executive secretary of the Board of Child Welfare. When his friend F. D. Roosevelt became governor of New York, Hopkins directed its emergency relief administration, and on Roosevelt's election as president he was made federal administrator of emergency relief. In 1938 he became secretary of commerce. In 1941, in charge of the lend-lease programme, he attended a meeting of the British war cabinet, the first foreigner to be invited. He was present at the signing of the Atlantic Charter, accompanied Roosevelt to war-time conferences, and upon the latter's death in 1945 became personal adviser to President Truman, though ill-health soon compelled him to resign. He was presented with the U.S. Distinguished Service Medal, Sept., 1945. He died Jan. 29, 1946. His *White House Papers*, ed. R. E. Sherwood, 2 vols., were published in 1948-49.

Hopkins, JOHN (d. 1570). English clergyman. Educated at Oxford, he became a schoolmaster, and from 1561 was rector of Great Waldringfield, Suffolk. With his friend Thomas Sternhold (*q.v.*) he was part-translator of the metrical version of the Psalms printed by J. Day in 1562, once attached to the Book of Common Prayer, and superseded in 1696 by the version of Tate and Brady. Hopkins' initials are attached to 56 of the 150 psalms.

Hopkins, MATTHEW (d. 1647). The English witch-finder. During 1644-47 he made journeys through Essex, Suffolk, Norfolk, and Huntingdonshire in pursuit of quarry. As witch-finder-general he seems to have been responsible for the deaths of several hundred old women and also of John Lowes, the octogenarian vicar of Brandeston. Denounced as a wizard, he was submitted to his own test of being thrown into a pool with

thumbs and toes bound together crosswise, and, swimming instead of sinking, was pronounced guilty and hanged. *See* Witchcraft.

Hopkinson, JOHN (1849-98). British engineer. Born at Manchester, July 27, 1849, and educated at Owens College and Trinity College, Cambridge, he graduated senior wrangler in 1871. He became engineering manager in some glass works in Birmingham and there he in-



John Hopkinson,
British engineer
Elliott & Fry

vented improvements for light-house mirrors. Moving to London in 1878, he set up for himself as consulting engineer. He improved dynamos and introduced the series-parallel system for motors. He was professor of electrical engineering at King's College in 1890. While mountaineering in Switzerland he and three of his children were killed, Aug. 27, 1898.

Hopper. The name given to a number of insects, in particular the hop flea, one of the most destructive of plant-eating beetles, especially the hop plant; the larva of the cheese fly; and in the compound grasshopper.

In engineering a hopper is any enclosed chamber or vessel with sides which slope downwards towards an outlet closed when required by a trap door or panel. Hoppers are provided in the bottoms of bunkers for the discharge of their contents by gravity. The sloping sides of a hopper are set at such an angle that the contained material will slide freely down towards the opening. Hopper barges, used in dredging, have hinged flaps on their bottoms, enabling the dredgings to be quickly and easily discharged. Hopper dredgers combine the ordinary dredger and

hopper barge and work on a similar principle to the hopper.

A hopper in brewing is the vat used for infusing hops. The word is also a popular name for hop pickers.

In certain types of pianoforte actions the escapement lever is called a hopper because it hops out of a notch when struck.

Hoppner, JOHN (1758-1810). British painter. Born at Whitechapel, of German parents, April 4, 1758, he became a boy chorister in the royal chapel. His mother, a German attendant at the palace, was in favour with George III, who made the boy a small allowance to enable him to study at the R.A. schools, 1775. In 1782 he gained the gold medal for an historical painting; he was elected A.R.A. in 1792, and R.A. in 1795, having been appointed portrait painter to the prince of Wales in 1789. After Reynolds's death he had no rival in portrait painting except Lawrence, and enjoyed a virtual monopoly of the Carlton House circle. He died Jan. 23, 1810.

The prince of Wales, the dukes of York and Clarence, Wellington, St. Vincent, Pitt, Castlereagh, Canning, the countess of Darnley, the countess of Oxford, and Lady Mary Arundel were among his sitters. His style was based on that of Reynolds, but his colouring is individual and brilliant, and his landscape backgrounds are specially effective; his drawing was often indecisive. He was highly successful as a painter of children. *See* illus. Abercromby; Bedford, Duke of; Duncan, Viscount; Erskine, Baron; Gifford, W., etc.

Hops and Hop-growing. The hop (*Humulus lupulus*) is a perennial twining plant of the family Cannabinaceae, native of temperate Europe, Asia, and North America, growing wild in English hedgerows as far N. as Yorkshire; in Scotland and Ireland as an escape from cultivation. It has a stout, branching, underground rootstock, from which arise the annual stems, rough with small hooks, which twine themselves "with the sun" around any available support, to a height of 15 ft. to 20 ft. The large, rough, heart-shaped, lobed and toothed leaves are produced in opposite pairs.



John Hoppner,
portrait painter
Self-portrait



Hops. Leaves, and cone-like heads of hops ready for picking

Each plant is either male or female, the respective flowers being quite unlike. The small green male flowers, which consist of sepals and stamens only, are clustered in branching sprays, while the females form spikes in which the flowers are hidden by overlapping bracts. After pollination by the wind these develop into cone-like heads—the hops of commerce. At the base of each scale of the cone there are glands which exude a resinous substance known as lupulin, to which the entire importance of the hop is due.

The cultivation of the hop for brewing dates back in Europe to the Middle Ages, but the industry was not known in England until 1524, when it was introduced from Flanders. But the use of hops by brewers encountered strong popular opposition. Nowadays about 20,000 acres are devoted to their cultivation in Kent (chiefly), Sussex, Surrey, Hants, Hereford, and Worcestershire, while additional supplies are imported from the continent of Europe and British Columbia.

The cultivation is attended by considerable expense owing to the need for vigilance in countering the attacks of insect and fungoid pests. Propagation is effected by division of the "sets" or root-stocks, and strings supported by poles are provided for the stems or "bines" to twine around. A modern development of this, known as the telegraph system, consists of horizontal wires, crossing the garden and supported by poles, from which strings depend for training the bines.

The most favourable soil for hop-growing is a calcareous loam, heavily manured with nitrogenous material in autumn, followed by frequent dressings of phosphates. The cones, when ripe, are hand-picked from the bines and dried in kilns or oast-houses by air at a temperature between 120° F. and 140° F., and are then fumed with the gas of sulphur dioxide to fix the colour and odour. The latter emanates from the golden powder into which the lupulin has consolidated. The yield of dried hops per acre varies greatly from year to year, according to weather conditions and the comparative prevalence of pests, but the average may be put at 10 cwts.

In medicine hop products are regarded as tonic, stomachic, and moderately narcotic. The freshly dried cones made into a pillow are useful for procuring sleep by inhalation of the aroma. They are



Hops and Hop-growing. London hop-pickers at work among the prolific crops at Paddock Wood, Kent, during the Second Great War

used, also, for fomentations and poultices; and extract and tincture of lupulin are prescribed. The pure lupulin grains may be shaken from the scales of the hops, but much of the commercial lupulin is obtained by sifting the sweepings of the oast-houses.

To pick the hops labour of a most unskilled type is brought from London and other large towns, special arrangements for this purpose being made by the railway companies. Men, women, and children work in the fields in groups at a scale of pay agreed upon between employers and employed. The conditions under which these people live when at work are primitive, their shelter being often barns and outhouses, but many families in the East End look forward to their week in Sept. in the Kentish hop grounds. Some improvement has been brought about by mission work. See Beer; Brewing.

Hop-Scotch. Game played by children. It is very old and quite simple. With a piece of chalk, a space is marked upon the ground, and this is divided into a number of divisions, 10 or 12, which are numbered. While hopping, the player must kick a stone into each one of the squares in order, coming back to where he started from. If he kicks the stone too far, or into the wrong division, he gives way to another player, and so on. Scotch is an old synonym for scores, hence the name.

Hopton, RALPH HOPTON, BARON (1598–1652). English royalist. A Somerset man by birth, he was educated at Lincoln College, Oxford. Like many other young men of that time, he obtained some military experience abroad, fighting for the elector palatine during the earlier part of the Thirty Years'

War. He was returned to Parliament in 1640, and was knighted. When the Civil War broke out Hopton was made lieutenant-general for the king in the west. He was mainly responsible for the royalist successes in Cornwall, where in 1643 he gained a victory



Baron Hopton,
English royalist
After Van Dyck

at Stratton. At Lansdown Hill he was again successful, but afterwards fortune was less kind to him and he was beaten at Cheriton in 1644. However, he continued in the field and in

Jan., 1646, became commander-in-chief; but, defeated at Torrington, he soon surrendered. He was with the prince of Wales, afterwards Charles II, in the Channel Islands, but his concluding years were passed in retirement at Bruges, where he died in Sept., 1652. His barony, granted by Charles I, became extinct on his death.

Hoquiam. City of Washington, U.S.A. On Gray's Harbour, in the co. of that name, on the Pacific coast, it controls with Aberdeen the commerce of the U.S. greatest lumber port and also exports fish. Wooden products are made. Pop. (1950) 11,123.

Hor. Mt. in Arabia on which Aaron died. It has been identified with Jebel Harun, on the summit of which the alleged tomb is shown.

Horace (65–8 B.C.). The Roman poet whose full Latin name was Quintus Horatius Flaccus. He was born Dec. 8, 65 B.C., at Venusia in Southern Italy, and died at Rome, Nov. 27, 8 B.C. His father, though only a freedman, was determined

that his son should have the best education obtainable. After six years' schooling in Rome Horace was sent to Athens at the age of eighteen to complete his studies. On the outbreak of the civil war he received an appointment as an officer in the Republican army, and was present at its defeat at Philippi in 42. Returning to Italy, Horace's comparative obscurity saved him from the proscription which was the fate of more important personages in the vanquished party, and before long he was occupying a junior post in the public service.

About the year 38 came the turning point of his life, when he was introduced by Virgil to Maecenas, the generous patron of letters, who was then collecting around him the literary aspirants of the time. Horace's aspirations were to achieve distinction in satire, expressed in hexameter verse, that peculiarly Roman form of literature invented by Lucilius. Five years after the publication of his first book of satires he published his epodes, a small collection of lampoons, but this was a disappointing effort after the promise shown in its predecessor. After the epodes came another book of satires in which Horace strikes a surer note. The vulgarity and scurrility which had characterised some of his earlier productions tend to disappear, being replaced by a quiet humour and a sane criticism of life based on a shrewd knowledge of human nature.

The Four Books of Odes

The crowning achievement of Horace's life is to be found in his immortal odes, *monumentum aere perennius* (a monument more enduring than bronze), to use the poet's own words. Three of the four books of odes were published in 23 B.C., while the fourth appeared at a later date. The first three books represent about ten years' work, and cover a wide variety of themes—love and conviviality; the joys of country life on the Sabine farm which the generous Maecenas had given Horace; the glories of Rome's past and the still greater glories of its present as personified in the emperor Augustus, whose genius had brought order and good government out of the chaos of the civil wars. In form the odes are based on Greek models, and Horace shows amazing skill in adapting the Latin language to an extraordinary variety of metres, notably Alcaic and Sapphic. The odes abound in familiar quotations, which is no small measure of the universality of their appeal.

The maturity of Horace's genius



Horace, the Roman poet as depicted in a fresco by Raphael
Vatican, Rome

is also reflected in his epistles, which, like the satires, are cast in hexameter verse. It is in these expressions of his outlook on life and literature more than in any other of his works that Horace reveals himself most intimately. One of the epistles is the work commonly known as the *Ars Poetica*. The principles of literary criticism which it expounded were not meant by Horace to be taken too seriously, but later ages curiously enough regarded the *Ars Poetica* as an authoritative guide.

The Poet's Artistry

Certain obvious criticisms present themselves. Horace did not sound the depths of passion as other great lyric poets have done, and his reflections on the mysteries of life and death often verge on the commonplace. Yet his will always remain among the great names of literature. As a literary artist he is unsurpassed. Literally hundreds of the phrases in which he has crystallised his thoughts have passed into the currency of the educated of all time. The ability to make an apposite quotation from Horace was once considered an essential of the education of a gentleman. The following are the approximate dates of his works: Satires i, 35 B.C.; Satires ii and Epodes, c. 30 B.C.; Odes i, ii, iii, 23 B.C.; Epistles i, 20 B.C.; *Carmen Saeculare*, 17 B.C.; Odes iv, 13 B.C.; Epistles ii, *Ars Poetica*, between 13-8 B.C.

Bibliography. The most useful edition for the general student is that by E. C. Wickham with English notes, 1903. There are renderings into English verse by J. Conington, 1863; Sir T. Martin, 1881; Lord Dunsany translated the Odes, 1947. Consult also *Roman Literature*, W. S. Teuffel, trans. G. C. Warr, 1891-92; H. and the *Elegiac Poets*, W. Y. Sellar, 1892; H. and his *Lyric Poetry*, L. P. Wilkinson, 1945; *Portrait of H.*, A. Noyes, 1947.

Horae (Gr. *Horai*). In Greek mythology, the goddesses of the seasons, daughters of Zeus and Themis. They regulated the seasons so as to promote the fertility of the earth. Their number varied from two to four; their best known names were Thallo, Carpo, and Auxo, goddesses of the bloom, ripening, and increase of fruit. In Hesiod their names are Eunomia, good order, Dikē, justice, and Eirēnē, peace, indicating that the earlier weather goddesses had attained a moral significance as the preservers of law and order in human life as well as in the realm of nature. In art they are represented as beautiful young maidens, bearing the fruits of earth incident to the season with which each was identified. Temples were erected in their honour at Athens, Corinth, Argos, and elsewhere.

Horae Subsecivae (Leisure Hours). Volumes of essays and papers by Dr. John Brown (*q.v.*), published in 1858, 1861, and 1882. The first volume deals mainly with subjects more or less intimately connected with the author's medical profession. In the second series was included the famous Rab and His Friends, and in the third papers on Leech and Thackeray. The essays, which include many notable studies of Scottish characters, are written in a simple and engaging style. Consult Dr. John Brown, J. T. Brown, 1903.

Hora Kutna OR KUTNA HORA. Town in the Bohemian portion of Czechoslovakia. It is 47 m. E. of Prague on the main rly. to Vienna. A mining town, it was famous in the Middle Ages for its silver-lead mines, but was ravaged in the Thirty Years' War. It preserves some notable buildings, including a former royal residence. Iron founding, the manufacture of farm implements, and calico, tanning, and sugar refining are modern industries. Pop. 14,370, mostly Roman Catholics.

Horatii. In Roman legend, three brothers born at one birth, who, in the war against Alba in the reign of Tullus Hostilius, were chosen to fight the three brothers of the Alban army, named Curiatii, also born at one birth. After two of the Horatii had been killed, and the three Curiatii wounded, the third of the Horatian brothers pretended to flee. Followed by the Curiatii, he slew them singly, one after the other. As the victor returned to the city in triumph, he was met by his sister, who was betrothed to one of the dead Curiatii.

Recognizing her lover's cloak among the spoils, she cursed her brother, who in his anger turned

and slew her. Brought to trial, Horatius was condemned, but on appeal to the people received pardon, on account of his valour. Horatius Cocles, who defended the bridge across the Tiber against Lars Porsena, was a descendant of Horatius. *See* Cocles.

Horbury. Urban district of the West Riding of Yorkshire, England. It is 4 m. S.W. of Wakefield. and manufactures woollens, worsteds, yarns, sports equipment, rly. wagons, mining tools, and machinery. Pop. (1951) 7,965.

Hordaland. Fylke or county of Norway, formerly called S. Bergenhus. It is bounded W. by the Atlantic and E. by Buskerud and Telemark counties, and has a coast indented by the Hardanger and other fiords. Fishing is an important industry. The chief town is Bergen. Area 6,020 sq. m. Pop. (1950) 198,047.

Horder, THOMAS JEEVES HOR-
DER, 1ST BARON (1871-1955).
A British physician. Born at



Lord Horder,
British physician

Shaftesbury, Jan. 7, 1871, he was educated at London University and St. Bartholomew's Hospital, of which he became senior physician. Knighted in 1918, he was physician in ordinary to the prince of Wales from 1923, retaining the post while the prince reigned as Edward VIII and also under George VI. Horder was raised to the peerage in 1933. His interests covered dietetics, radiology, eugenics, and physical training. He was president of the food education society, and adviser to the ministry of Food. He published *Health and a Day*, 1937; *Obscurantism*, 1938; and *Fifty Years of Medicine* (memoirs), 1952. He died Aug. 13, 1955.

Horeb. Another name for Mt. Sinai, Egypt. It is identified with Jebel Musa, on which the law in the O.T. is supposed to have been given. The monastery of S. Catherine is near by. Horeb and Musa are the twin peaks of Mt. Catherine, one of the traditional heights claimed as Mt. Sinai.

Hore-Belisha, LESLIE HORE-
BELISHA, BARON (1893-1957).
British politician. Born Sept. 7, 1893, the son of J. I. Belisha (d. 1894), and educated at Clifton and St. John's, Oxford, he added the name Hore to his surname on his

mother's marriage in 1912 to Sir Adair Hore. After a period as a journalist Hore-Belisha entered parliament as Liberal member for Devonport in 1923, and the same year was called to the bar. As minister of Transport, 1934-37, he introduced the "Belisha Beacon" (q.v.) and the pedestrian crossing over highways, also the test for motor-drivers, the speed limit for



Lord Hore-Belisha,
British politician

the built-up areas, and other road reforms. During his term as secretary for War, 1937-40, conditions of service were improved and better opportunities of promotion were provided, though his "axeing" of senior officers aroused some resentment. In April, 1939, he was responsible for putting into operation the first peace-time conscription measure in Great Britain. He resigned in Jan., 1940, and was never in office again—except for a short period as minister of National Insurance in Churchill's "caretaker" government of 1945. In the 1945 election he lost his seat and joined the Conservative party. Hore-Belisha was an elder of the congregation of Spanish and Portuguese Jews. Created a baron in 1954, he died suddenly at Reims, Feb. 16, 1957. He left no heir to the title.

Horehound (*Marrubium vulgare*). Perennial herb of the family Labiatae. It is native to



Horehound. Foliage and flower whorls
of this medicinal herb

Europe, N. Africa, and Asia, and has heart-shaped, leathery, wrinkled leaves with rounded teeth, and white flowers in dense whorls. The whole plant is woolly and aromatic. The Romans esteemed it as a drug, but it is now used only

in domestic medicine as a remedy for coughs.

Horizon (Gr., *horos*, boundary). Imaginary circular line round which the earth and sky appear to meet and bounding that part of the terrestrial surface visible from any given point. It is most clearly defined at sea. If r is the radius of the earth, the distance d of the horizon from an observer at a height h above sea level can be found from Pythagoras:

$$d^2 = (r+h)^2 - r^2 = 2rh + h^2.$$

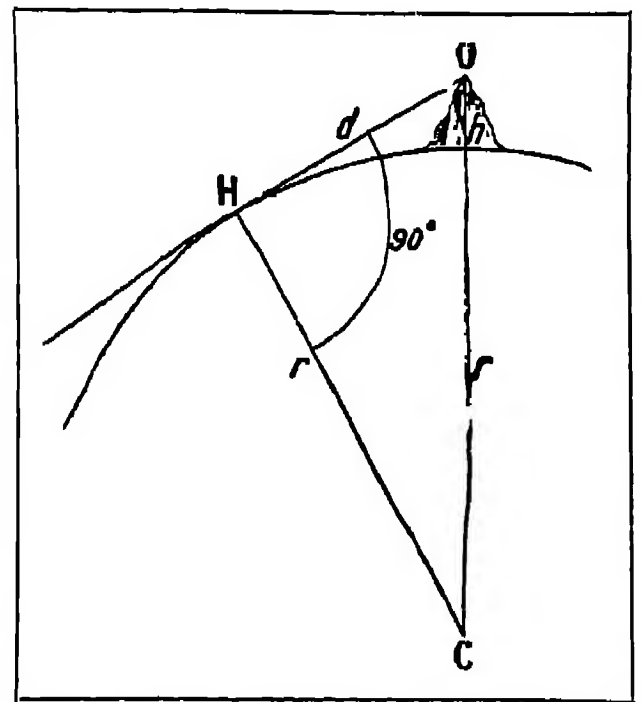
Since h is small compared with r , h^2 may be neglected, so that to a first approximation $d = \sqrt{2rh}$. If h is given in feet and the mean radius of the earth is taken as 2956.5 miles, the formula becomes

$$d = \sqrt{(7913h/5280)}$$

$$= 1.224\sqrt{h} \text{ statute miles}$$

$$= 1.066\sqrt{h} \text{ nautical miles.}$$

This gives the approximate distance of the true horizon. But



Horizon. O, observer; C, centre of earth; H, horizon. *See* text

refraction tends to make the surface of the sea visible slightly beyond this point, and an arbitrary correction of 8 p.c. is usually applied, giving

$$d = 1.322\sqrt{h} \text{ statute miles}$$

$$= 1.148\sqrt{h} \text{ nautical miles.}$$

For many purposes of practical navigation the formula $d = 1.1\sqrt{h}$ is found to be sufficiently accurate.

In observations of the altitude of celestial bodies allowance must be made for the dip of the horizon, i.e. the vertical angle between true horizontal and the line OH from the observer to the visible horizon. The angle is equal to the angle subtended by OH at the centre of the earth, and its value in minutes of arc approximately equal to d , where d is in nautical miles. Again a correction for refraction (usually -7.5 p.c.) has to be applied, so that the dip in minutes of arc works out at $0.983\sqrt{h}$, where h is in feet.

The astronomical horizon may be defined as a great circle in which a plane tangential to the surface of still water at the place of observation cuts the celestial sphere. The term geological horizon refers to the chronological position of any rocks which have been formed at the same period of the earth's evolution, irrespective of their method of origin or stratigraphical arrangement.

The artificial horizon used in astronomy consists of a flat dish containing mercury so placed that it forms a horizontal reflecting surface. It is employed for determining the altitude of the sun by measuring the angle between the direction of the sun and its image reflected in the mercury. The artificial horizon used in air navigation is an instrument operated by a gyroscope designed to keep an indicator permanently parallel with the true horizon. It shows the pilot the angle of his aircraft in cloud or bad weather.

Horley. Parish and village of Surrey, England. It stands on the Mole, 5 m. S. of Reigate, is known to motorists as the half-way mark from London to Brighton, and has a railway station. The church is an old building dedicated to S. Bartholomew. Pop. 7,749.

Hormone (Gr. *hormain*, to excite). A chemical messenger. Hormones are complex chemical substances secreted by various glands of the body and passed direct into the blood stream without the medium of a duct. Carried to distant parts of the body, they produce a stimulating or modifying effect on growth or function. These chemical reactions represent a stage in evolution when controls were chemical, not nervous. See Endocrinology.

Ormuz or **ORMUZ.** Ancient city of Persia, built partly on an island and partly on the mainland, in the narrow channel, the Strait of Hormuz, connecting the Persian Gulf with the Gulf of Oman. It was founded in the 3rd century, and soon became a great centre of commerce. It was captured by the Portuguese in 1594, and from them by the British in 1622. It steadily declined in importance, and Bandar Abbas, which lies on the mainland a few miles N. of Ormuz Island, has taken its place. The island has deposits of red ochre, some being normally exported to Great Britain. The name Hormuz is now held by an inland village, some 70 m. W. of Bandar Abbas at the foot of the Kuh-i-Hormuz, 9,200 ft.

Horn (Lat. *cornu*). Name given to the substance which forms the claws, nails, etc., of animals, and also to particular growths, e.g. loosely, the antlers of deer, or more properly the horns of a cow. True horn is a modification of epidermic tissue, and is seen in the nails and hair of human beings, the hair, claws, and hoofs of animals, and beaks and feathers of birds. The scales of snakes are of a horny nature; tortoiseshell and the corns and callosities of animals are different varieties.

In the horns of cattle, sheep, and antelopes the central part is bone, the outer core being the true horn tissue. These horny sheaths are shed annually, in the prong-horn antelope, the bony centre continuing to grow to maturity, but in oxen and sheep the horny sheath remains throughout life. Such

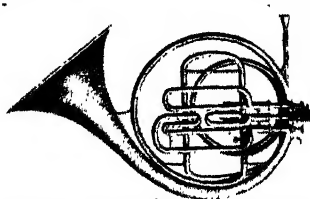


horns are developed after birth, except in the giraffe, the only animal born with horns. The shape and size and position of the horns are distinctive in each animal, as also is the cross section.

The composition of true horn is substantially that of keratin (*q.v.*) and consists of about 50 p.c. carbon, 6-7 p.c. hydrogen, 20-25 p.c. oxygen, 16-17 p.c. nitrogen, the remainder being sulphur. It is laid down in the substance of the most superficial layers of the human skin and is rubbed off as the cells containing it die. The cells lining the vagina of mice and other mammals become horny at mating time.

Horn is still in use for making buttons, handles of knives, forks, umbrellas, etc., and ornaments, though partly superseded by plastics. The horns of ox, sheep, and goat are the more commonly used, and when softened by long-continued soaking can be split into layers. These layers are flattened under pressure and coalesced once more by pressure and alternate soaking in hot and cold water. The horn can readily be dyed, and the dyed horns of the cheaper kind are used for imitation tortoiseshell. See Black Buck; Cattle.

Horn or **FRENCH HORN** (Fr. *cor*; Ital. *cornu*; Ger. *Horn*). Brass instrument of tenor compass, derived from the primitive hunting-horn. When horns began to be made of metal, there was no longer any limit of length, and it was found that a long tube would



Horn. Three-valved French horn as used in orchestras

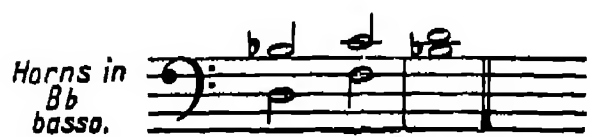
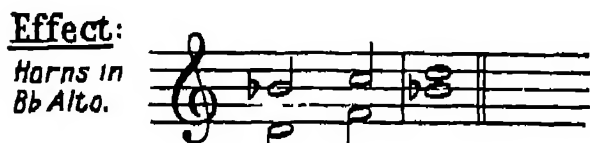
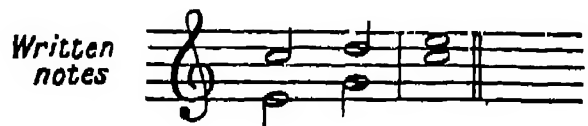
furnish more notes than a short one, by varying the lip—not the wind—pressure. The tubes were coiled for convenience of handling, and quite elaborate fanfares were played on the hunting horns during the period 1650-1750.

The horn appeared in the orchestra soon after 1700. It possessed then only the harmonic series of notes, which on the horn pitched in F sounded—

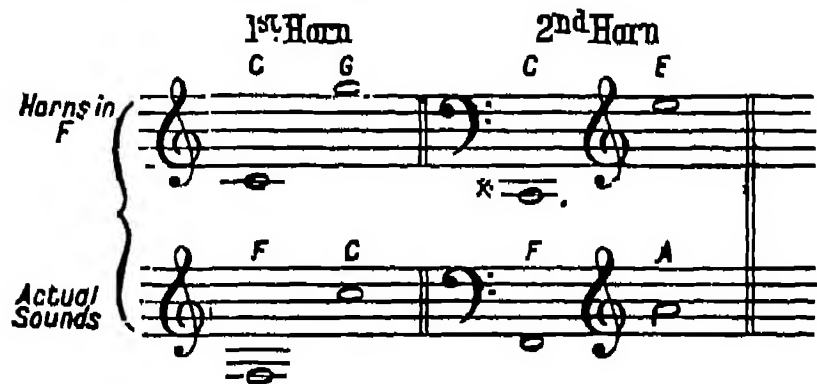
No. 1 is not commonly used, and Nos. 7, 11, 13, and 14 are out of tune with the ordinary scale. Horns in several keys were employed in order to make the best use of their incomplete scales, and Bach wrote some extremely florid horn parts, with only these notes at his disposal, and had to seek a consecutive scale amongst the higher notes (8 to 16), just as he and Handel did with their trumpets. But the best tone with the horns lies between Nos. 4 and 12, and it was a gain to music, when a Dresden player named Hampl, about 1770, discovered that the insertion of the right hand in the bell of the instrument lowered the pitch. A diatonic scale from Nos. 4 to 8, and a complete chromatic scale from 5 to 16, became possible. It is true that the stopped notes were less resonant than the others, but the device inspired Haydn, Mozart, Beethoven, Schubert, Weber, Mendelssohn, and Spohr, for about a century from 1750, to allot to the horns some immortal strains.

To minimise the use of stopped notes, horns in various keys were still used, and the classic form of the instrument during this period was a single horn, built in B flat alto (sounding a tone lower than the written notes), with crooks—extra coils of tubing—to lower the pitch to any key down to A flat basso, a major tenth lower than the notation (*see Interval*). Their music was always written in key C, or in a related key, with altered notes as accidentals, and the actual

sounds depended on the crook named at the beginning of the score. The typical transpositions shown here make this clear.



The final revolution in horn playing came with the addition of pistons (*q.v.*) on the system adopted for military brass instruments. These have given the horn a complete chromatic scale of even power. There is now no reason for writing for the horn as a transposing instrument except tradition. The player thinks of the actual pitch of the note he is to blow before he can secure it, as a singer does; and the horn player's written notes have all to be translated in his mind into terms of true pitch. The compass of the horn being large, it is usual to divide players into firsts and seconds, who cultivate the lip pressures for high and for low ranges respectively. Convenient limits are:



When more than two horns are used in the orchestra they are still treated in pairs, 3 and 4 being relatively another 1 and 2. See Clarinet; Cornet; Trumpet.

Horn, CAPE (Sp. Cabo de Hornos). The southernmost point of S. America. It is the S.E. point of Horn Island, most easterly of the Hermit group in the archipelago of Tierra del Fuego, and belongs to Chile. A

steep, bare, black rock, 1,390 ft. high, with pointed peaks, it was discovered by the Dutch navigator Schouten in 1616, who named it Cape Hoorn after his birthplace. Drake sighted it in 1578. Drake Strait separates it from the South Shetland Islands, Antarctica. Sailing vessels round the cape, but steamers use the Strait of Magellan. Windjammers frequently had to make two or more attempts to pass from the Atlantic to the Pacific against the prevalent W. winds. Consult Cape Horn, F. Riesenberg, 1941.

Horn, ALFRED ALOYSIUS (d. 1931). Scottish trader and traveller.

Born near Glasgow, and educated in Liverpool, he went to W. Africa in 1871 and became a trader in ivory and rubber. Then he tried a roving life, shot big game, and fought in several wars. In Johannesburg he met Etheldreda Lewis, the novelist, and was persuaded by her to recount his adventures and crystallise his quaint philosophy in such books as *Harold the Webbed* and *The Ivory Coast in the Earlies*. The latter formed the basis of a film, *Trader Horn*. He visited England in 1927 and died June 26, 1931.

Horn, ARVID BERNHARD, COUNT (1664-1742). Swedish statesman. He was born at Vuorentaka, Finland, April 6, 1664, and, having served with distinction with the Swedish army against France, 1690-95, was promoted to the rank of general in 1700. Four years later, having taken part in the deposition of Augustus of Poland and the election of Stanislas, he became ambassador to the latter.

In 1710 he became Swedish chancellor. In 1719, after the death of Charles XII, he made the granting of a new constitution the condition of the election of the late king's sister Ulrica to the throne, persuading her to accept it by election instead of hereditary right. As leader of the Cap party, he was in effect the ruler of the country, which flourished so under him that "the time of Arvid Horn" became proverbial. In 1738 the rival Hat party succeeded in gaining power, and Horn retired, having put together a code of laws and secured its approval by the diet in 1734. He died April 17, 1742.

Hornbeam (*Carpinus betulus*). Native British tree of the family Betulaceae. Its average height is 60 ft. It is an excellent hedge plant, and may be raised from



Hornbeam. Specimen of a sapling of this British tree

seeds planted in the autumn and transplanted when the seedlings are three years old. A good tree for a heavy soil, it forms a strong fence against horses and cattle. The timber is very hard, but of no great value for commercial purposes except those of the wheelwright. It is, however, much esteemed for use by charcoal burners. The hornbeam may be distinguished from the beech by (among other points) its deeply serrated leaves. It is very common in Epping Forest. See Deciduous Tree.

Hornbill. Popular name for the birds of the family Bucerotidae, which have horn-like growths at the base of their great beaks. They vary in size from about that of a rook to the dimensions of a turkey, and are found in the warmer regions of the Old World, especially in India and Africa. They spend most of their time on the ground, being slow fliers, and feed chiefly on fruit and insects. The nest is constructed in a hollow



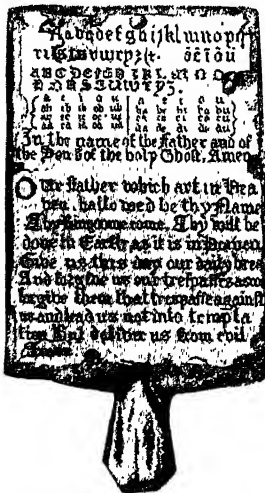
Hornbill. Bare-beaked variety, *Ceratogymna elata*, a native of West Africa

tree and during incubation the male plasters up the hole, leaving only a small opening through which he feeds the sitting hen.

Hornblende. Important rock-forming mineral. Hornblende is a complex silicate of calcium, magnesium, and iron, with sodium and aluminium, of variable composition. All varieties crystallise in the monoclinic system with a characteristic prismatic cleavage. Edenite is light coloured, poor in iron; pargasite is dark green or blue; basaltic hornblende is a brown or black variety. Hornblende occurs as a primary mineral, in acid and intermediate igneous rocks; more rarely in basic rocks; commonly in metamorphic rocks derived from igneous rocks, such as gneisses, schists and amphibolites.

A hornblende schist is a foliated metamorphic rock of hornblende with lesser amounts of feldspar, quartz, iron oxides, epidote, and sometimes garnet. With increase in coarseness of texture, it grades into amphibolite. It is commonly derived from basic igneous rock or volcanic ashes by alteration due to earth movements accompanied by heat. Hornblende is an intrusive igneous rock of hornblende, occurring in dykes; it has a coarsely crystalline or granitic texture.

Hornbook. Early form of school primer used in England down to the time of George II. It consisted usually of a flat piece of wood provided with a handle. On it was



Hornbook found at Middleton in 1828. The black-letter alphabet and prayer are protected by transparent horn pinned to the wood
By courtesy of the Leadenhall Press

placed or tacked a sheet of paper or parchment containing the alphabet, numerals, combinations of the vowels with b, c, and d, and the text of the Lord's Prayer, protected by a layer of transparent horn. Sometimes the paper was pasted on to the wood, sometimes let into a hollowed-out space. The first hornbook was made about 1450. The hornbook is referred to in Shakespeare's *Love's Labour's Lost*, 5, 1.

Horncastle. Urb. dist. and market town of Lindsay, Lincolnshire, England. It stands at the foot of the Wolds at the junction of the Bain and Waring streams, 21 m.



Horncastle, Lindsay, Lincolnshire. Parish church of St. Mary, which contains interesting monuments
Philip G. Hunt & Co.

by railway E. of Lincoln. The town was long noted for a great horse fair held annually in Aug., and described by George Borrow in *Romany Rye*. In the church of St. Mary is a monument to Sir Ingram Hopton, who was killed in an attempt to seize Cromwell at the skirmish near Winceby in 1643. A Roman ditch and Roman wall are the sole reminders of the Roman station, Banovallum. Horncastle gives its name to a county constituency. Market day, Sat. Pop. (1951) 3,809.

Hornchurch. Town and urban dist. of Essex, England. It is 14 m. E. of London, near Romford, and is mainly residential. St. Andrew's church has a carved oxskull with widespread horns on the apex of the E. gable, assumed to symbolise the name Hornchurch. The large airfield was used as an R.A.F. fighter station in the battle of Britain, 1940. During the Second Great War Hornchurch was on the outer ring of London's A.A. defences, and, in spite of the scattered lay-out of its buildings, half were made unserviceable by enemy air action. Hornchurch is served by rly. and by London Transport. It forms a bor. constituency. Pop. (1951) 104,128.

Horne, Charles Silvester (1865-1914). A British Congregational preacher. Born at Cuckfield, Sussex, April 15, 1865, he was educated at Newport (Salop), Glasgow university, and Mansfield College, Oxford. Minister of Kensington chapel, 1889-1903, he was chairman of the London Congregational Union, 1902, and minister of Whitefield's

C. Silvester Horne, British preacher
Elliott & Fry

Tabernacle, 1903-14. Keenly interested in social questions, he was Liberal M.P. for Ipswich from 1910 until his death, May 2, 1914. He wrote *Popular History of the Free Churches*, 1903. His son Kenneth (b. 1907) became a well-known radio comedian.

Horne of Slamannan, Robert Steven-

SON HORNE, VISCOUNT (1871-1940). British politician. Born Feb. 28, 1871, and educated at George Watson's College, Edinburgh, and Glasgow university, he was during 1895-1900 professor of philosophy at University College, Bangor, and at Aberdeen univ. Called to the Scottish bar in 1896, he took silk in 1910. At the beginning of the First Great War he was secretary of the agricultural section of the national service department, later going to France on the directorate of transport, and in 1918 becoming 3rd civil lord of the Admiralty and K.B.E.

Elected in 1919 Conservative M.P. for Hillhead, Glasgow, he was made minister of Labour. In 1920 he became president of the board of trade, and in 1921 chancellor of the exchequer. With the fall of the Coalition government, he abandoned politics for the City, becoming chairman of the G.W.R. and a director of P. & O. and of Lloyds Bank. During 1921-24 he was lord rector of Aberdeen university. A viscount from 1937, he died without an heir Sept. 3, 1940.

Horned Screamer (*Anhima cornuta*). Large goose-like bird found in S. America. The plumage



Horned Screamer. Specimen of this South American bird

is glossy black above, with white below, and the bird has a long, yellow, hornlike growth on the head. See Screamer.

Horned Toad (*Ceratophrys*). Large batrachian found in S. America, often 6 ins. long. It has an enormously large mouth, and feeds chiefly on frogs. Ten species are known.

Horned Viper (*Cerastes cornutus*). Snake found in N.E. Africa up to Palestine. It frequents sandy



Horned Viper. Specimen of this venomous N.E. African snake

places, where it lurks half buried, leaving only the eyes, horns, and nostrils to be seen. It is highly venomous, and specimens range up to 30 inches in length.

Hornel, EDWARD ATKINSON (1864-1933). British artist. Born at Bacchus Marsh, Australia, of Scottish parents, he was brought home to Kirkcudbright. He studied for three years at the R.S.A. schools, Edinburgh, and for two under Verlat at Antwerp, returning to Scotland in 1885, when he identified himself with the Glasgow school. He visited Japan and then settled down at Kirkcud-

bright. In 1901 he was elected to the Royal Scottish Academy, but declined the honour.

Among his works one may cite especially Fair Maids of Feb-

ruary, 1900; Water Lilies, 1901; Autumn, 1905; and The Music of the Woods, 1907. His pictures generally represent children in a landscape setting, rich in colour and decorative in purpose. He is represented in municipal collections, e.g. the galleries of Liverpool, Glasgow, Bradford, Leeds; Adelaide, Montreal, Toronto; Buffalo, St. Louis. He died in July, 1933.

Hornell. City of New York, U.S.A., in Steuben co. It stands on the Canisteo river, 92 m. S.E. of Buffalo, and is served by the Erie and other rlys. It is in the midst of a region which produces pota-



Horned Toad. A large South American batrachian, with horn-like projection over the eyes

atoes and fruit. Industries include manufacture of textiles, hosiery, gloves, leather goods, wagons, farm implements, electrical machinery, tiles, and bricks, and there are also rly. workshops and foundries. Settled in 1790, Hornell was incorporated as Hornells-ville in 1820, became a city in 1888, and received its present name in 1906. Pop. (1950) 15,049.

Horners' Company. London city livery company. Consisting of makers and sellers of drinking horns, hunting horns, lanthorns, powder horns, inkhorns, etc., it had been in existence for nearly 400 years when in 1638 it received its first charter. At that time glass was taking the place of horn, wood, and pewter. With it was amalgamated in 1476 the ancient guild of bottlers, or makers of leathern *botels*. The offices are at 3, Lawrence Pountney Hill, E.C.4. In the 20th cent. the company flourished greatly; the livery in 1957 being 400. It has a close association with the plastics industry, whose products

resemble those formerly made by the craftsmen in natural horn. The company grants an annual award for craftsmanship in plastics.

Hornet (*Vespa crabro*). Largest of the British wasps. It is found in the southern and midland counties of England, and is readily recognized by its reddish bands and markings, which replace the black of an ordinary wasp, and its large size, being nearly an inch in length. It constructs its nest on the beams of outhouses or in holes in thatch, or preferably in hollow trees. Its larvae are partly fed upon captured bees and wasps. Its sting is severe, but it is not aggressive, and will rarely attack. See Antennae; Wasp.

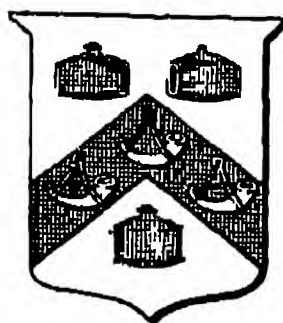


Hornet. 1. Male insect. 2. Queen

Hornet Moth (*Trochilium apiformis*). Largest British representative of the clearwing moths. The wings are transparent like those of bees and wasps, owing to the absence of the scales which clothe those of other lepidoptera. In the hornet moth the margins of all the wings have a narrow border of brown scales, but the greater area is translucent with a yellowish tinge. The stout, elongated body is a clear yellow with several bands of blackish brown. The forebody is dark brown also. The large, orange-coloured hind legs are extended backward in a manner that greatly helps the protective resemblance to a stinging insect. The yellow-white, maggot-like caterpillar feeds on the wood of poplar trees. A somewhat smaller species, the lunar hornet moth (*T. crabroniformis*), is illustrated in the article Clearwing Moth.

Hornfels. Hard compact metamorphic rock formed by alteration of pre-existing rock by heat derived from nearby intrusions of igneous rock, such as granite. The original rock is completely recrystallised and earlier structures in it are commonly obliterated. Varieties are named after the new minerals that have developed in hornfels, e.g. biotite, cordierite, andalusite. Alteration of lime-bearing rocks produces hornfels in which lime-silicate minerals predominate. Such rocks are often green or white. See Metamorphism.

Horniman, ANNIE ELIZABETH FREDERICKA (1860-1937). British theatrical manager. Born at



Horners' Company arms



E. A. Hornel, British artist
T. & P. Annan

Forest Hill, S.E. London, Oct. 3, 1860, daughter of F. J. Horniman, founder of Horniman's museum (*v.i.*), she studied art at the Slade school, and later became private secretary to W. B. Yeats (*q.v.*). In 1904 she leased the Abbey Theatre, Dublin, and in 1908 bought the Gaiety Theatre, Manchester, with which she was associated until 1921. A pioneer of the repertory theatre, she commissioned plays by St. John Ervine, Harold Brighouse, and others. Long the leader of the little theatre movement, she was made C.H. in 1933. She died Aug. 6, 1937. *Consult* Miss H. and the Gaiety Theatre, R. Pogson, 1952.

Horniman's Museum. Museum in London Road, Forest Hill, London, S.E. The collection includes specimens of natural history, entomology, ethnology, costumes, and books. The surrounding grounds of 15 acres are laid out as a park, and the whole place was made free to the public in 1901. It was presented to the public by F. J. Horniman (1835-1906) and is a fine piece of architecture. It was damaged 1944 by a flying bomb.

Horning, LETTERS OF. In Scots law, a procedure which could be used by a creditor to compel a debtor to pay his debt. Formerly the letters directed a messenger-at-arms to charge (*i.e.* order) the debtor to pay; if he failed to do so, the messenger denounced him rebel (*i.e.* an outlaw) by blowing three blasts with a horn at the market cross of Edinburgh or of the head burgh of the shire in which the debtor lived. His movables were then forfeit to the crown. The creditor could also obtain letters of caption authorising the imprisonment of the debtor. This ancient ceremony has long been disused. Although letters of horning without this ceremony may still be used, a creditor now normally proceeds under the Personal Diligence Act, 1838. Imprisonment for debt was with some exceptions abolished by the Debtors (Scotland) Act, 1880.

Hornpipe. Name of an obsolete reed instrument, popular in the Middle Ages, and also of a lively dance, which probably derived its name from the instrument. The dance was formerly in triple time, but about 1760 it was altered to common time, in which the melody has been written since. A well-known example is the sailors' hornpipe.

Horn Poppy (*Glaucium tuteum*). Large annual or perennial herb of the family Papaveraceae. It is a

native of Europe, N. Africa, and W. Asia, growing on sandy seashores. The glaucous, leathery leaves are large and cut deeply into long lobes which are boldly



Horn Poppy. Flowers and giant seed-pods of this seaside plant

toothed. The yellow flowers are as much as 4 ins. across, and are followed by pods about 12 ins. long.

Horn Reef or HORNS REEF. Reef in the North Sea lying off the coast of Jutland, Denmark. The great naval battle known as the battle of Jutland (*q.v.*) was fought in the vicinity, May 31, 1916, and is sometimes called the battle of Horns Reef.

Hornsea. British seaside resort. An urban dist. of the E. Riding of Yorkshire, it is 16 m. by railway N.E. from Hull, and on the North Sea. The council owns a floral hall, public parks, gardens, recreation grounds, and a boating lake. Defence works include sea walls in the form of promenades. Hornsea Mere covers over 400 acres and is the largest fresh water lake in Yorks. The parish church, built 1480, is dedicated to S. Nicholas. Pop. (1951) 5,324.

Hornsey. Municipal borough and parish of N. London. It is in the co. of Middlesex, with a rly.



Hornsey arms

(the former name of the district), Muswell Hill, Finsbury Park, and Stroud Green. It has a striking town hall, built 1934-35. The manor belonged to the bishop of London before the Norman Conquest, as the name of Bishop's Wood reminds us.

In the time of Henry VI the lodge in Hornsey Great Park was a residence of the duke of Gloucester, and the scene of the alleged witchcraft referred to in Shakespeare's King Henry VI. Material from the old manor house of the bishop of London was used in building the 15th century church of S. Mary, rebuilt, excepting the tower, in 1832-33. The church contains interesting monuments. Samuel Rogers, the banker-poet, was buried in the churchyard. Near Muswell Hill was a cottage in which Thomas Moore once lived. Hornsey Lane traverses Highgate Archway. Hornsey forms a bor. constituency. Pop. (1951) 98,159.

Horn Silver. This has been described as cerargyrite (*q.v.*).

Hornung, ERNEST WILLIAM (1866-1921). A British novelist. Born at Middlesbrough, June 7,

1866, and educated at Uppingham, he gained in Australia experience which is reflected in his earlier novels: *A Bride from the Bush*, 1890, and *The Boss of Taroomba*, 1894. Other stories are *The Amateur Crackman*, 1899; *Stingaree*, 1903; *No Hero*, 1903; *Mr. Justice Raffles*, 1909; *The Crime Doctor*, 1914. Excelling in the vigorous handling of sensationalism, he will best be remembered as the creator of Raffles, the gentleman burglar. This character was a success on stage and screen. Hornung died March 22, 1921.

Hornwork. Type of entrenchment or fortification providing two blunt salients towards the front and opportunities for considerable flanking fire. During the Middle Ages it was frequently used to protect gateways or other openings into a fortress.

Hornology (Gr. *hōra*, hour; *logos*, word). Art and science of timekeeping. The uniform flow of time is measured by some regularly recurrent physical phenomenon. From earliest antiquity the apparent rotation of the heavens was used to fix the day, and the motion of the moon and the sun around the zodiac determined the month and the year respectively. Subdivision of the day into hours by the use first of the gnomon (*q.v.*) and then of the sundial was supplemented in cloudy weather and at night by water-



E. W. Hornung,
British novelist
Elliot & Fry

clocks, graduated candles, and hour-glasses. The earliest mechanical clocks in the 14th century were regulated by no better device than a foliot balance. The clock was a poor timekeeper until Huygens in 1657 applied the pendulum (*q.v.*); he also made portable watches possible by using a spring-controlled balance wheel. In the 18th century, Harrison and Graham applied temperature compensation to the pendulum and the balance wheel, and there were parallel advances in the design of escapements. Graham's dead-beat escapement (1715) is still in common use, and Le Roy's chronometer of 1765 embodied the germ of most of the devices used in modern marine chronometers.

Modern methods for attaining extreme accuracy abandon the principle of mechanical oscillation in favour of oscillations in an electric circuit controlled by the vibrations in a quartz crystal due to piezo-electric effects. Such clocks at Greenwich Observatory achieved an accuracy to within 1/1,000 sec. a day. In 1949 the American Bureau of Standards demonstrated an atomic clock in which the crystal is checked against the vibration frequency of atoms in an ammonia molecule. It is believed to be accurate to at least 1/1,000,000 sec. a day. *See* Calendar; Clock; Time; *consult* Science of Clocks and Watches, A. L. Rawlings, 1944.

Horowitz, Vladimir (b. 1904). Russian pianist. Born in Kiev, he studied under Felix Blumenfeld,



Vladimir Horowitz,
Russian pianist

and made his first public appearance at the age of six. The brilliant success of a series of 23 recitals in Leningrad led to a European tour, and in 1928 he first visited the U.S.A. He settled there and married the daughter of Arturo Toscanini. By the 1940s his place was secure among the great pianists.

Horabin, James Francis (b. 1884). British journalist and artist. Born Nov. 1, 1884, at Peterborough, he became a metal-work designer, but joined the Sheffield Telegraph as an artist in 1906. In 1911 began his association with the London Star, for which he drew comic strips, the daily series Dot and Carrie first appearing Nov. 17, 1922. The Noah Family,

the daily children's feature which he drew for the Daily News, begun on June 13, 1919, was still appearing as The Arkubs in the News



J. F. Horabin,
British journalist
and artist

Chronicle over 28 years later. His talent for black-and-white found expression in the making of specialised maps and charts; he designed the television news map series. A lecturer in Labour colleges and editor of Plebs magazine, 1914-26, he was Labour M.P. for Peterborough, 1929-31. He illustrated Wells's Outline of History, and L. Hogben's Mathematics for the Million, and Science for the Citizen; and published An Outline of Economic Geography, 1923; Working Class Education (with his wife), 1924; A Short History of the British Empire, 1929, rev. ed. 1946; and topical atlases.

Horrocks or Horrox, Jeremiah (1619-41). English astronomer. Born at Toxteth Park, Liverpool, he was educated at Emmanuel College, Cambridge. He became a tutor and then a clergyman; but his main interest was in astronomy. He worked at a revision of the Rudolphine Tables and was the first to observe the transit of Venus on Nov. 24, 1639, which he alone predicted. His short career was full of activity; he undertook tidal observations and ascribed an elliptical orbit to the moon. He died, Jan. 3, 1641.

Horsa. British troop-carrying glider of the Second Great War.

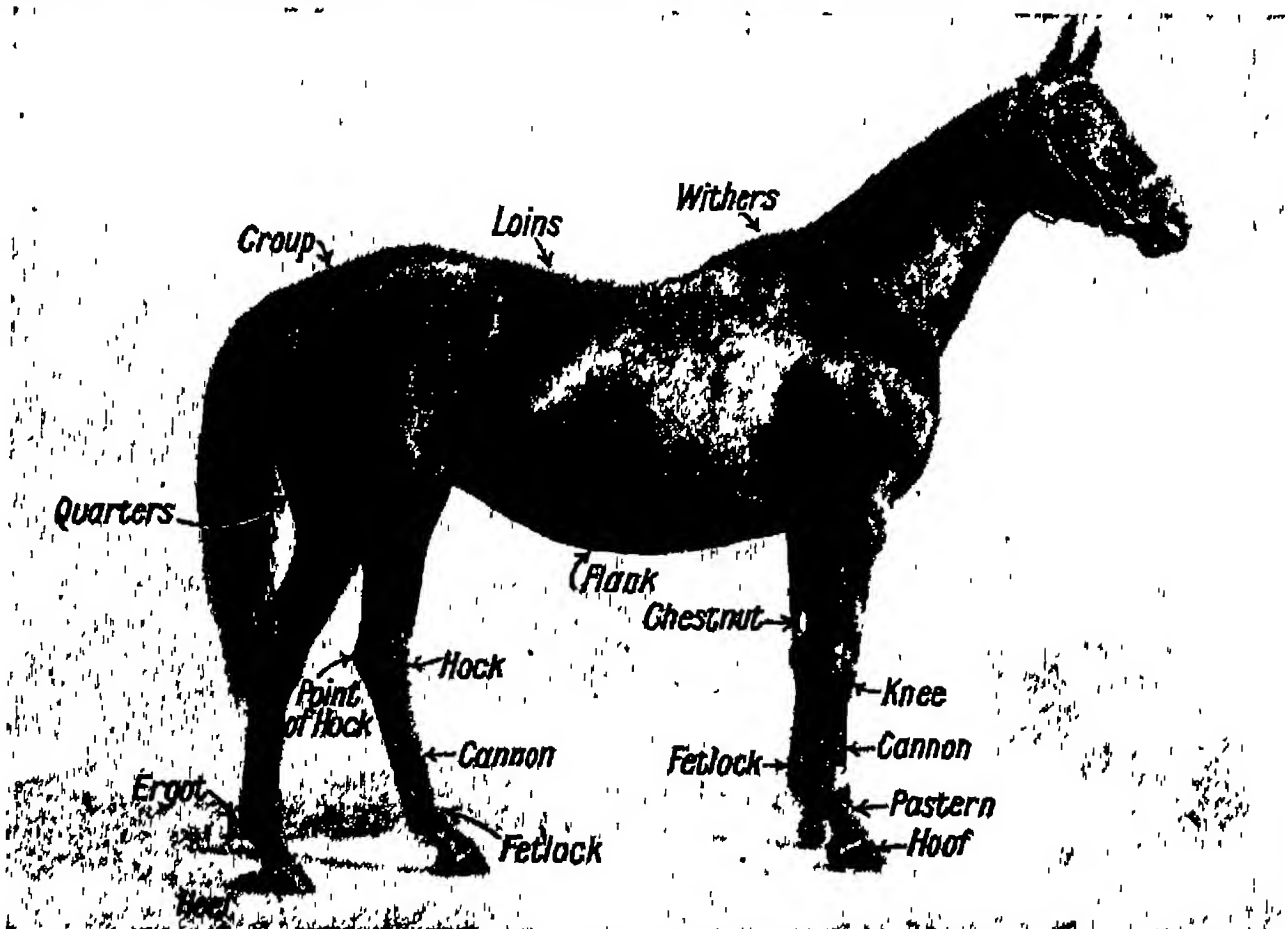
It had a wooden framework for ease of production and a large box-like fuselage for maximum load capacity. The wing span was 88 ft. Load capacity was three tons of freight or a section of 15 fully armed and equipped men. Large numbers of Horsa gliders were used on D-day, in the Arnhem assault, and at the Rhine crossing.

For the Anglo-Saxon chief Horsa, *see* Hengist.

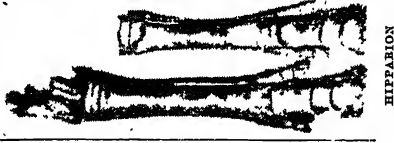
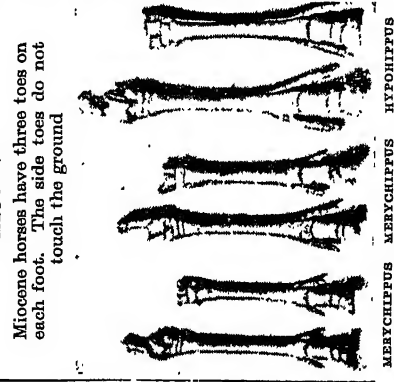
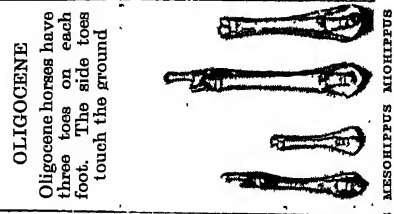
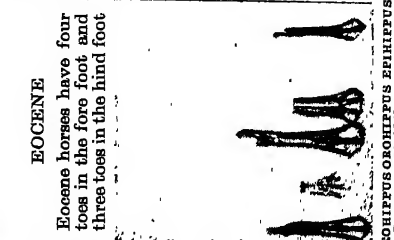
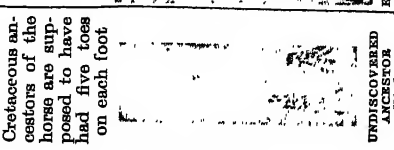
Horse. In geology, a mass of rock broken from one wall and caught between the walls of a fault. Masses of wall rock included in mineral veins are likewise named. They are sometimes enormous, and usually more or less lenticular or tabular in shape.

Horse. Family of the odd-toed ungulata, or hoofed animals, comprising the zoological order Perissodactyla. The horse family (Equidae) includes the horse, ass, zebra, and quagga, all closely related anatomically, but most usefully regarded as distinct species. They all interbreed, but the hybrids are almost invariably sterile.

All the family are distinguished by the peculiarity that they stand on a single toe of each foot. Originally they had five toes, as is shown by the fossil remains of extinct horses—or rather ancestors of horses—but two toes have quite disappeared and the other two are now represented by the splint bones, two small bones lying close alongside the cannon bone and terminating just above the fetlock. The earliest known ancestor of the horse, Eohippus, was no larger than a hare, and remains have been found of a series of intermediate forms leading up to the modern animal.



Horse. Diagram illustrating the points taken into consideration when judging the quality of a horse

AGE OF MAN Estimated at 1,000,000 years	AGE OF MAMMALS Estimated at 45,000,000 years	AGE OF REPTILES
PLEISTOCENE MODERN	<div data-bbox="215 534 663 675"> <p>PLIOCENE</p>  <p>PLIOCENE Hipparion Lower Pliocene</p> </div> <div data-bbox="215 675 663 1054"> <p>MIOCENE</p> <p>Miocene horses have three toes on each foot. The side toes do not touch the ground</p>  <p>MIOCENE Hyporhippus Middle Miocene Merychippus Middle Miocene Merychippus Middle Miocene</p> </div> <div data-bbox="215 1054 663 1266"> <p>OLIGOCENE</p> <p>Oligocene horses have three toes on each foot. The side toes touch the ground</p>  <p>OLIGOCENE Miohippus Upper Oligocene Mesorhippus Middle Oligocene</p> </div> <div data-bbox="215 1266 663 1504"> <p>Eocene</p> <p>Eocene horses have four toes in the fore foot and three toes in the hind foot</p>  <p>Eocene Eohippus Lower Eocene Eohippus Middle Eocene Eohippus Upper Eocene</p> </div>	<div data-bbox="215 1504 663 1654"> <p>CRETACEOUS</p> <p>Cretaceous ancestors of the horse are supposed to have had five toes on each foot</p>  <p>CRETACEOUS Undiscovered Ancestor allied to Condylarthra</p> </div>

With reference to the six exhibits on the right, some Pliocene horses have three toes, others have one toe on each foot. Both Pliocene and modern horses have one toe on each foot

HORSE: STAGES IN THE EVOLUTION OF THE FEET OF THE HORSE AS REVEALED BY THE STUDY OF FOSSIL REMAINS

By courtesy of the American Museum of Natural History

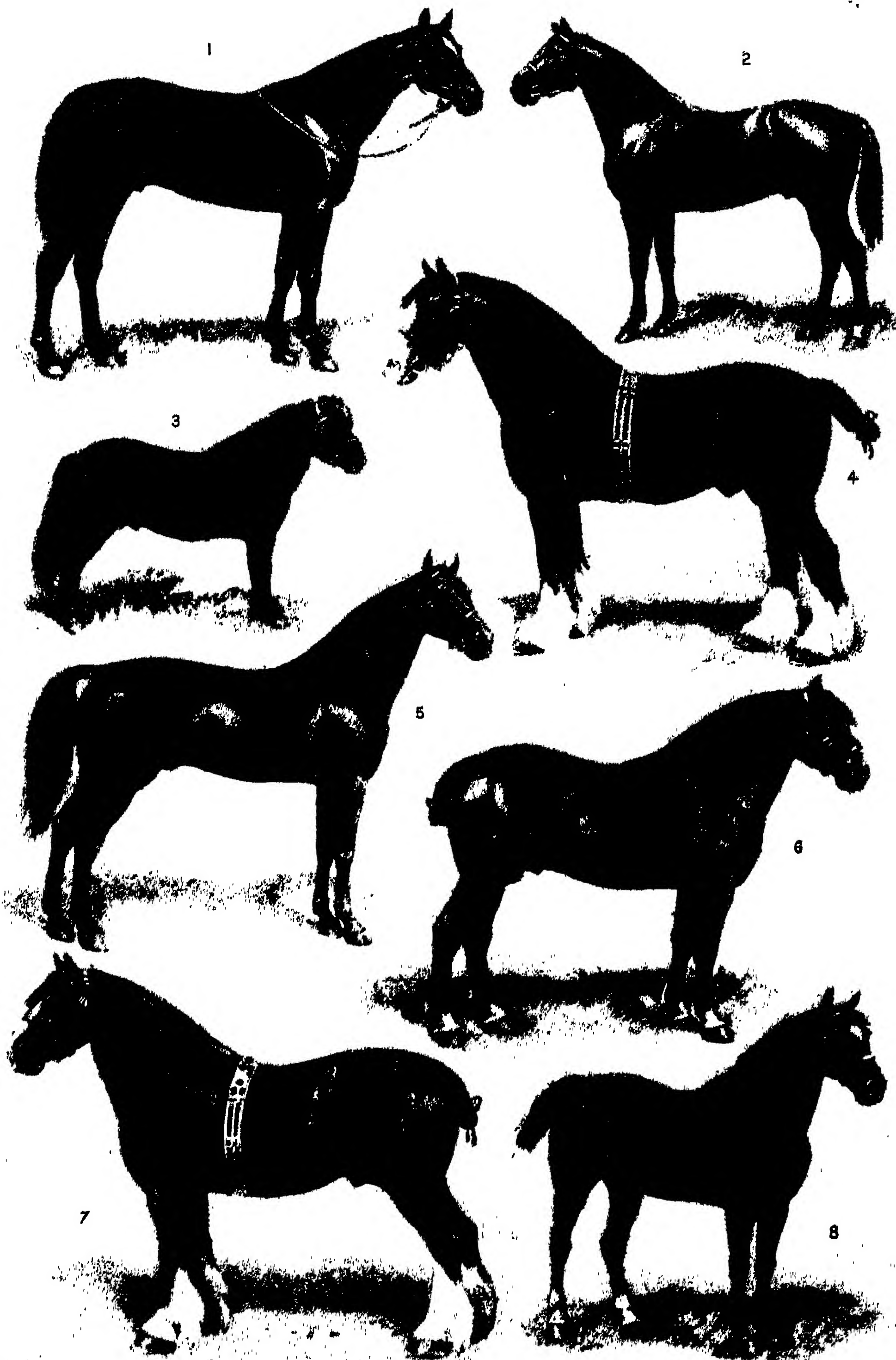
The horse is distinguished from the ass and the zebra by the absence of striping, though a stripe is occasionally present on the back and rarely on the legs; the presence of chestnuts or warts on all the legs; and the even-haired tail, the hairs beginning close to the base, and not in a tuft at the extremity. It is also usually larger.

The horse now occurs in the wild state only in Mongolia, where Przevalsky's horse is found in large herds. This resembles a shaggy pony, with upstanding mane, and the hairs on the tail are short at the base and long at the tip, approaching the tuft seen in the ass and zebra. The evolution of the horse took place mostly in the Old World. In each great geological epoch the New World received horses from the Old, but always they died out. The mustangs of N. America and the so-called wild horses of the pampas of S. America are merely descendants of domesticated European animals that have strayed and taken to a feral life. A rather primitive type of wild horse formerly inhabited Great Britain, and some authorities think that the Connemara and Shetland ponies are its direct descendants. Numerous prehistoric carvings and sketches of horses suggest that more than one type of animal was then known. A few early sketches bear lines thought to represent primitive harness.

The Horse in History

In history we find the horse domesticated from the earliest periods, as shown by Assyrian and Egyptian sculptures. It is mentioned in the Pentateuch, but as an animal used by other nations than the Hebrews, among whom it seems to have been rare until the reign of Solomon. In Britain Caesar found that the southern tribes possessed cavalry, and also had scythe-wheeled chariots drawn by horses. These were probably Celtic ponies, as the larger types of horse seem to have been introduced by the Norman invaders. The Flemish war horse soon afterwards appeared, the heavy shire or cart horse rather later. The introduction of tournaments under Henry II, and of racing soon afterwards, developed different breeds.

In the reign of Henry VII a mare of fair quality could be bought for seven shillings. The increase in the weight of armour led to the breeding of horses of great bone and strength, and pack horses were largely in use for carrying goods. In the reign of Queen

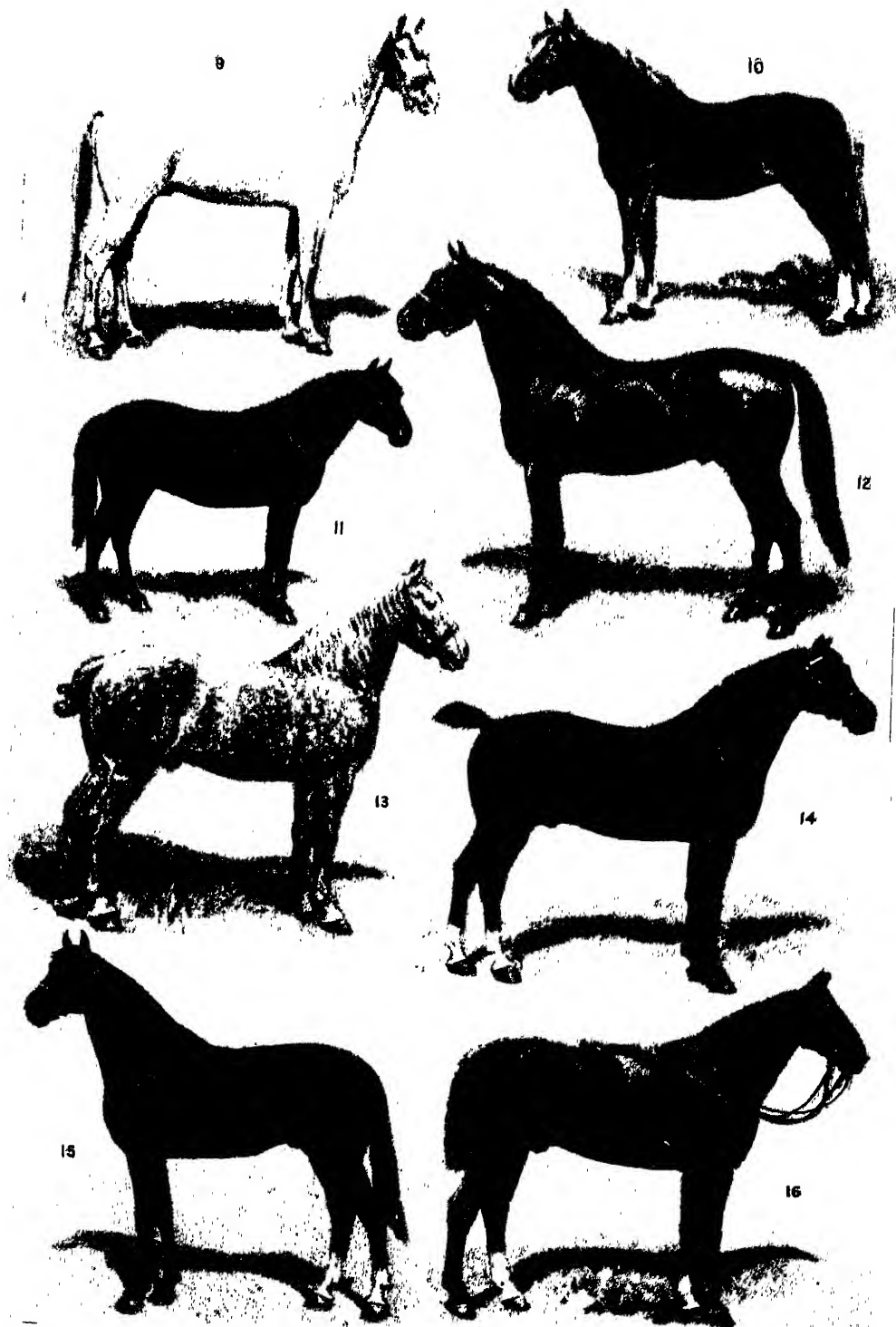


1. Thoroughbred. 2. Polo pony. 3. Shetland pony. 4. Clydesdale. 5. Yorkshire coach horse. 6. Suffolk punch. 7. Shire horse. 8. Cob

HORSE : ANIMALS REARED FOR DRIVING, AGRICULTURE, AND SPORT

To face page 4314

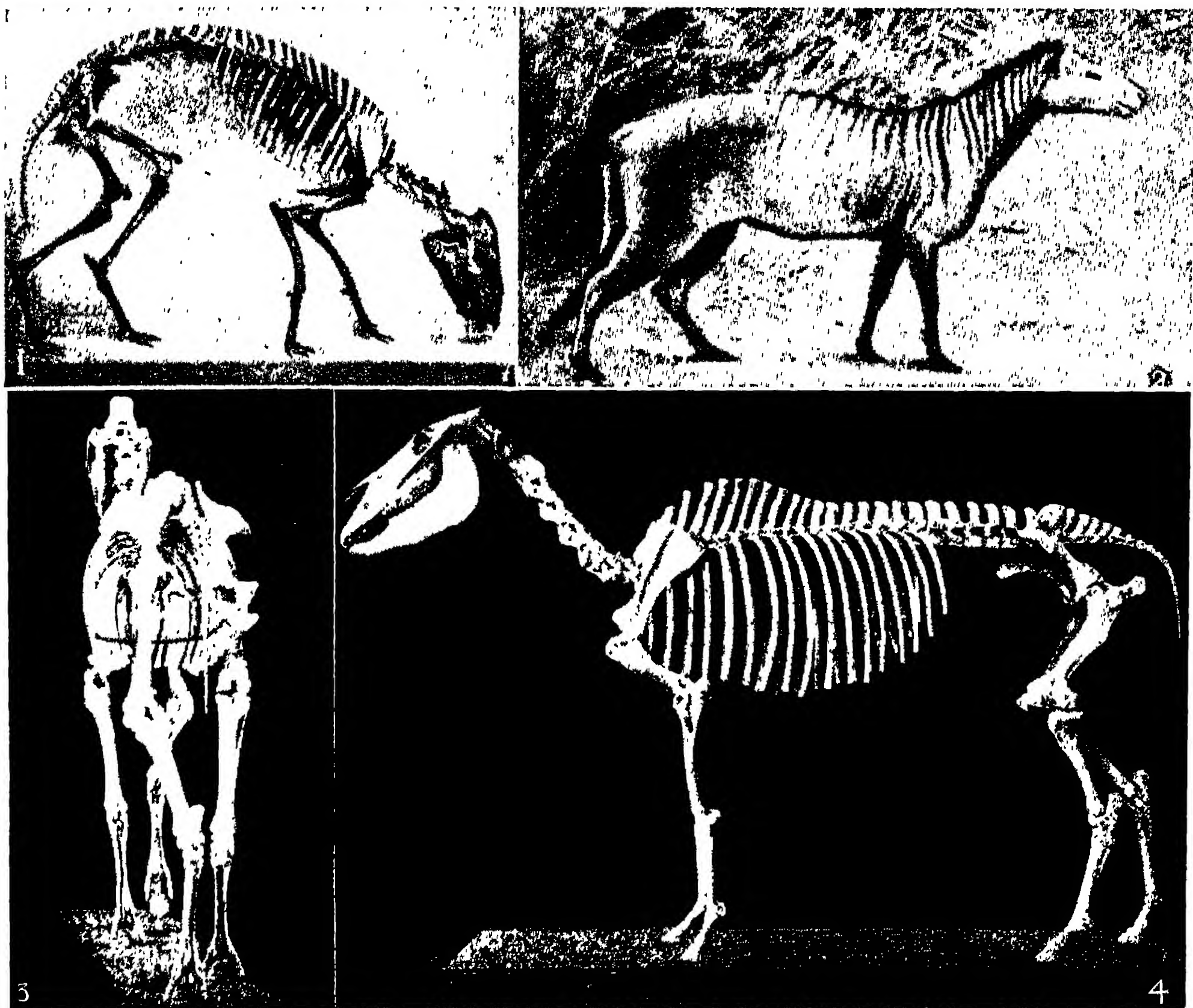
See over



9. Arab. 10. Welsh pony. 11. Dartmoor pony. 12. Cleveland bay. 13. Percheron. 14. Hackney. 15. American
trotter. 16. Hunter

HORSE: LIGHT AND HEAVY TYPES BRED FOR ROAD AND FIELD

See over]



Horse. Stages in anatomical evolution. 1. Skeleton of four-toed horse of Eocene period, discovered in Wyoming, 1910. 2. Restoration of same, standing 16 ins. high. 3. Skeleton, from rear, of three-toed horse of Miocene period, showing small side toes. 4. Skeleton of *Equus Scotti*, horse of Lower Pleistocene period

By courtesy of the American Museum of Natural History

Elizabeth the use of coaches became general, and the carriage type of horse was consequently developed, while the importation of Arabs, and the later improvement of roads, produced the lighter and more graceful breeds.

The domesticated breeds chiefly met with in Great Britain consist of riding, carriage, and cart horses. Riding horses include the thoroughbred, the hackney, and the pony; carriages horse are mainly Cleveland bays and coach horses; while the Shire, Clydesdale, and Suffolk punch are the three strains used for cartage and heavy work.

Of agricultural horses, the Shire horse, the direct descendant of the old English war horse, heads the list for size and weight. It is the largest horse in the world, standing 17 hands high, and often attains a weight of 2,000 lb. The fenlands of Lincolnshire and Cambridgeshire and the clay soils of Leicestershire produce this breed.

Though of immense strength, it is remarkably docile. Its legs are

exceptionally massive and well feathered, *i.e.* they have a covering of long hair from the backs of the knees and hocks to the pasterns. The neck should be well arched to the shoulders, the chest wide, the back short and straight.

Clydesdale and Suffolk Punch

The Clydesdale takes the place of the Shire horse in Scotland, and is very similar in general appearance, but smaller and of rather more slender proportions. It is said to be a cross between the old Scottish breed and the Flemish horse. It is less arched in the neck and more sloping at the shoulders than the English breed. The legs are feathered, and a white blaze on the face is usual. The breed combines great powers of endurance with activity of movement, and is very docile. At times it has been largely exported to the colonies and abroad.

The Suffolk punch is the agricultural horse of E. Anglia, where it has been bred since the 16th century. Its appearance is quite

unlike that of any other breed. It has a short head, remarkably deep and high-arched neck, very short legs, and a generally chubby shape—whence probably its name punch. It stands 16 hands high, and may weigh as much as the Shire horse. The breed having been kept pure for many generations, the distinctive characteristics are well maintained. It is always chestnut in colour, though the shades vary greatly. Owing to its hardiness, great activity, and fine pulling qualities, it is highly valued, and in demand for export.

Of carriage horses, the Cleveland bay may be regarded as the foundation. It has long been bred in Yorkshire, and seems to have originated in crosses between the thoroughbred and common horses of the old breeds. It tends to show zebra-like stripes on the legs, which is supposed to denote purity of blood. But, following the analogy of what is usually met with in experiments in hybridisation, it would rather seem to suggest

exactly the opposite. The Cleveland bay combines a graceful appearance with the more useful qualities of a working animal. It is in great demand for crossing purposes to make hunters and chargers, and is largely exported.

The coach horse, or Yorkshire coach horse, was developed from the Cleveland bay over a hundred years ago, and is usually a dark bay with black legs. Mainly bred in Yorkshire, it has a considerable strain of thoroughbred blood. It stands 16 hands high, and is notable for its fine appearance and high-stepping action.

Artificial insemination makes it easy to produce in a short time many offspring from one stallion selected for desirable qualities.

Of saddle horses the thoroughbred heads the list. Its breeding has been absolutely controlled for over a century, during which time it has added some inches to its stature. It is seen in its finest form in the racehorse, and has a considerable strain of Arab blood in its composition. The most graceful of all the British breeds, though the extreme greyhound type has developed grace at the expense of more useful qualities, it stands about 16 hands high, should have a long lean head, sloping shoulders, short deep back, muscular quarters, and slender legs. A good racehorse can maintain a speed of 35 m.p.h. for a mile. Some 5,000 racehorses are bred yearly in the British Isles.

The hunter is often a thoroughbred, but is more frequently a cross between that breed and the Cleveland bay. It should preferably be either black or chestnut. Other things being equal, the bigger the hunter the better the price; but it is all-important that it should possess speed, and be good and quick at fences. Perhaps a quarter of a million hunters are bred annually in the U.K. and Eire, especially Kildare and Tipperary.

The Hackney or nag is an old breed, the records of which go back to the 14th century. It is a famous trotter, and was formerly much used as a saddle horse. Its leading feature is the high and free action. The rider should be able to see the knee advanced before

the breast, and the legs should be thrust well forward before the foot is placed on the ground. The cob is a sturdy, short-legged horse suitable for saddle work.

The pony is a small breed ranging in height from the nine hands of the Shetland



Horse Chestnut. 1. Flower spike of the tree. 2. A magnificent specimen in full bloom. 3. The spiked fruit

to about 14 hands. It is an ancient inhabitant of Great Britain, and still roams half wild on Exmoor, Dartmoor, and in the New Forest.

As a worker the horse is still of economic importance throughout the civilized world, in spite of mechanisation, no other draught animal being of such all-round usefulness. Though its flesh is perfectly wholesome and palatable, its use as a table animal is now greatly restricted.

The rearing of horses in Great Britain is more widely distributed among small breeders than that of cattle and sheep. Foals are generally too valuable to encourage the method, which works quite satisfactorily with common stock under careful management, of working mares while suckling. Apart from infectious diseases that affect domestic animals generally, the common diseases to which the horse is liable include founder or

laminitis, pink eye, ringbone, sand-crack, sidebone, splint, strangles, and staggers.

See Animal; Evolution; Hippophagy; Mammal; consult also The Horse, Sir W. Flower, 1891; The Horse: Its Treatment in Health and Disease, J. Wortley Axe, 1906.

Horse Chestnut (*Aesculus hippocastanum*). Tree of the family Hippocastanaceae. Native of Asia and E. Europe, it averages 60 ft. in height, and bears pyramidal spikes of pink or white blossoms. After blooming the resulting seed, or nut, encased in its green spine-covered case, is the conker, dear to school-boys. Culture is easy in any ordinary soil, and increase is effected by planting carefully preserved conkers in the open, 3 ins. apart, in early spring. Horse chestnuts make particularly fine avenues. One in Bushey Park, Middlesex, is the finest in the world.

The red-flowered chestnut, known as *A. carnea*, is a hybrid between the common species and the N. American *A. parva*.

The bark of the tree contains a glucoside aesculin which, in acid solution, exhibits a beautiful blue fluorescence, and has been employed occasionally in medicine as a febrifuge. *See Angiosperm; Bud; Bushy Park.*

Horse-flies (*Tabanidae*). Extensive family of moderate-sized to large dipterous insects that are active on warm sunny days. They are stoutly built with a large head and conspicuous eyes marked with golden green or purple. The females feed by sucking the blood of horses and cattle, and frequently attack man: the males do not suck blood. These are the largest British blood-sucking flies, the females of *Tabanus sudeticus* measuring up to an inch. The eggs are laid in masses on plants growing in water or marshy places and the larvae live in damp earth. Over 3,000 species are known and some 28 kinds occur in Great Britain. The name cleg, some-



Horse-fly. Enlarged specimen of *Tabanus sudeticus*

times given locally to horse-flies, correctly belongs to the closely allied *Haematopota*, often a scourge, especially in parts of Russia.



Horse Fork in use in a Cornish stack yard

By courtesy of The Agricultural Gazette

horse at the other end, and liberated by loosening a catch with which the grab is provided.

Horse Guards. Government building between Whitehall and St. James's Park, London, S.W. It contains the old offices and audience-room of the commander-in-chief, and since 1904 has been the headquarters of the commander-in-chief of the home forces.



There are two wings, with a clock-tower over an arch in the centre, the archway opening upon the Horse Guards Parade, a large open space, once the Old Tilt Yard, where tournaments took place in Tudor times, and where the ceremony of trooping the colour takes place on the sovereign's birthday. There is a memorial to the Guards' services in the First Great War on the west side, facing the archway, slightly scarred by German bombs of the Second Great War, as are statue memorials to Kitchener (on the S. side) and Roberts (E. side). A statue of Wolseley was so severely damaged that it was removed.

The mounting and dismounting of the guard (provided by the Life Guards or Royal Horse Guards) at 11 a.m. (10 a.m. on Sundays) and 4 p.m. are among the most familiar

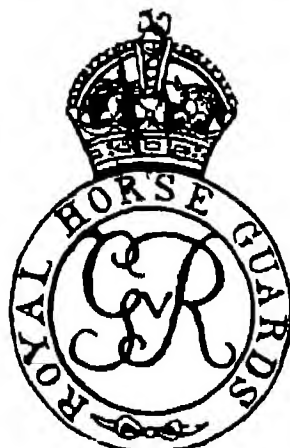
of London sights. The building, erected 1750-54, took the place of a structure built in 1641 to serve as a guardhouse for the palace of Whitehall. It was severely damaged by enemy air action in the Second Great War.

Only royalty or those on the lord chamberlain's list are permitted to drive through the gates to the park, but the passage is open to pedestrians.

Horse Guards, ROYAL. Regiment of the British army. It was formed in 1661 from disbanded troopers of

Crook's regiment of Cromwell's new model army. The Horse Guards became known as the Oxford Blues, because of the colour of their facings and because they were first commanded by the earl of Oxford. The regiment served at Sedgemoor, at the Boyne, and saw its first foreign engagement at Dettingen in 1743. It gained honours in the Seven Years' War and the Peninsular War and was present at Waterloo. It was in the charge at Tel-el-Kebir and fought throughout the S. African War. In the First Great War the Horse Guards served as both cavalry and infantry, fighting notably at Ypres.

At the outbreak of the Second Great War the Horse Guards and



Horse Guards' badge

6th armoured division in Italy. The 2nd formed a reconnaissance unit of the Guards armoured division in the liberation of Europe and the advance into Germany. At the end of the war, these two regiments reverted to their original titles of Royal Horse Guards, Life Guards.

Horsehair.

Tail and mane hairs of horses, tail hair having more value in commerce. As a

preliminary operation the raw hair is sorted, tail and mane hair being separated and graded according to length and colour. Various grades are blended for production of different qualities. Some qualities are dressed for special purposes, for making brushes, seating for carriages and furniture, stair carpets, lawyers' wigs, etc. Specially long white hairs go into violin bows, and shorter white hairs into plumes for military head-dress. The remaining qualities, after washing and sterilising, are blended, spun, and curled into ropes, the hair thus curled being baked at a high temperature. The curled and baked rope hair is finally untwisted and carded by hand or machine, and, as it neither felts nor becomes matted, provides a hygienic filling for bedding and upholstery.



Horse Guards. Trooper in full dress



Horse Guards, London. The building from St. James's Park. Upper picture, the frontage in Whitehall, showing the guard in the gateways

the Life Guards (*q.v.*) were amalgamated to form the 1st and 2nd Household Cavalry Regiments, and in 1941 went to Syria, where they were mechanised. The 1st served as an armoured car unit with the 8th army in N. Africa and with the

first in the bodies of aquatic snails and larvae, and the second in frogs, fishes, and water beetles. The adult is several feet long.

Horse Latitudes. Belts of calm air between the trade winds and the westerlies in each hemisphere.

Horsehair

Worm. Popular name for the threadlike worms of the class Gordiacea, nearly related to the nematode worms. The eggs of the common horsehair worm of British ponds are laid in the water, and the larvae pass through two parasitic stages: the

They are marked by steady high barometric pressure and are centred about 30° N. and S. of the equator. From them the westerly winds blow polewards and the trade winds equatorwards. They are said to have derived their names from the fact that in the days of sail, when vessels were becalmed for long periods in these latitudes, any horses on board were thrown into the sea so as to save drinking water for the crew.

Horse Leech. Name applied to two distinct species of annelids related to the medicinal leech. In



Horse Leech, amid water reeds

Great Britain it denotes *Aulostoma* (or *Haemopsis*) *gulo*. It is common in ponds and streams, where it preys upon tadpoles, newts, molluscs, and its own kind. Its three jaws edged with minute

teethlike serrations cannot pierce the tough outer skin of mammals, as do the harder, more efficiently toothed jaws of the medicinal leech. *Aulostoma* has only one pair of caecal appendages to the intestine, whereas *Hirudo medicinalis* has 10 pairs, in which food is stored.

The name horse leech belongs also to *Aulostoma* (or *Haemopsis*) *vorax*, of Europe and N. Africa, which attaches itself to the pharynx of horses, cattle, and men who may drink direct from streams. See Leech.

Horse Mackerel (*Trachurus*). Popular name for the scad, a common British fish which somewhat resembles a large mackerel, but belongs to a different family.



Horse Mackerel or Scad, a common British fish

Carangidae. It occurs in shoals, is often nearly 2 ft. long, has bony plates along the lateral line, and lacks the characteristic stripes of the mackerel. It is of little value for the table.

Horsens. Seaport of Denmark, in Vejle co., Jutland. It lies 32 m. by rly. S.W. of Aarhus and at the head of Horsens Fjord. The harbour is good and there is boating for pleasure. The chief build-

ing is a monastery of 1270. In the museum are exhibits of the Stone Age. Textiles and electrical apparatus are made and dairy produce shipped. Pop. 32,400.

Horse-power. Unit of mechanical power. In the early days of steam engineering the equivalent of 33,000 lb. raised through a distance of 1 ft. in 1 min. was adopted; though the energy output of a good horse is today taken as only four-fifths of 1 h.p. One h.p. is thus equivalent to 33,000 foot-pounds per min., or 550 per

sec.; 746 watts; 42.4 British thermal units; 1.014 metric horse-power.

"Indicated" h.p. of a reciprocating steam engine is calculated from a pressure diagram traced by an indicator (*q.v.*) connected to the cylinder or cylinders; it represents the power developed within the engine. "Brake" h.p. is the energy output (available for outside work) of the engine; it is measured by a dynamometer (*q.v.*) which the engine is caused to drive. See Steam Engine.

HORSE-RACING; A NATIONAL SPORT

V. E. Orchard ('Rapier' of Sport and Country, etc.)
This general sketch deals with flat racing. See *Sleeplechasing*; the articles on the great English racing centres, e.g., Ascot; Goodwood; Newmarket; and those on the great races, e.g., Derby, St. Leger. See also Horse; Jockey; Stud Farm; Totalisator

England, the home of the thoroughbred racehorse, has been famed for its horses from pre-Roman days. Julius Caesar was surprised at the superior quality of the horses employed in battle by Cassivelaunus. Records of early racing, however, are scanty and the safest date to be attributed to its beginnings as a sport may be found in the writings of Bede, where there is a reference to youths "that might run and try which had the swiftest horse." Fitz Stephen refers to contests at Smithfield in the reign of Henry II. Richard II, when prince of Wales, matched his horse in 1377 with one ridden by the earl of Arundel; this is possibly the first horse race of which an authentic account has been preserved.

Importation of Eastern Horses

Henry VIII being a great patron of racing and breeding, by 1540 there was organized sport at Chester, Doncaster, York, Carlisle, and in Scotland; also racing in Croydon and in St. James's Park. Elizabeth favoured racing and the chase, and her subject, Gervase Markham, published a classic treatise: *How to chuse, ride, traine and diet, both hunting-horses and running horses*. The advent of the Stuarts heralded the development of the racehorse proper, with the "discovery" of Newmarket by James I and the importing of Eastern horses which became the foundation sires from which the modern racehorse has evolved. Racing was banned in the Commonwealth regime, but the breeding of thoroughbreds was not seriously affected.

Royalty continued its patronage of the sport in the post-Restoration period, its greatest protagonist being Anne. Development in the

Georgian era reached its zenith in the Regency, when vast fortunes were staked on the turf, the interest in which became one of the major occupations of the nobility and gentry. William IV and Victoria took a moderate interest in the sport, but Edward VII was one of its greatest patrons, winning the Derby and St. Leger with Persimmon (1896), the "triple crown" with Diamond Jubilee (1900), and the Two Thousand Guineas and Derby with Minoru (1909). George V raced and bred with success, and King George VI carried on the tradition with zest, winning in 1942 the wartime Two Thousand Guineas with Big Game and the One Thousand Guineas, Oaks, and St. Leger with Sun Chariot.

The origin of the thoroughbred, although disputed by one authority who attributes it entirely to the importing of Arab stock, is generally recognized to be the result of mating Eastern stallions with native running horses. Notable sires imported were the famous Darley Arabian, the Godolphin Arabian, and the Byerley Turk. From these trace, in tail-male, all thoroughbreds of the present day. The families (an expression when applied to bloodstock normally indicating female line of descent) inevitably branched with the development of scientific breeding. A great proportion of our modern racehorses traces to Eclipse (1764) a descendant of the Darley Arabian. The Herod line traces to the Byerley Turk and the Matohem line to the Godolphin Arabian.

The racehorse, whose training begins in his yearling days, will normally race at two years old and frequently to the age of seven. He is presumed to be a year old on

Jan. 1 in the year following his foaling date. The flat racing season opens in late March or early April and continues until Nov. Races for two-year-olds are held from the first day of the season. Modern practice tends to confine the number of these first-season races to half-a-dozen outings. The two-year-old may race at 5 furlongs and, as the season advances, at 6 and occasionally at 7 or more.

At three years, a colt or filly becomes eligible to run in the classic races. These are the Two Thousand Guineas, the One Thousand Guineas (for fillies only), the Derby, the Oaks (for fillies), and the St. Leger. The respective distances of the races are 1 mile; the same; 1½ miles; the same; 1¾ miles. No horse has won all five classics. The filly Sceptre, in 1902, won all except the Derby. Successes in the Two Thousand Guineas, Derby, and St. Leger have been not infrequent, the winner being awarded the theoretical honour of the triple crown. Towards the end of the autumn, three-year-olds that stay well are normally saddled for races up to 2 miles and beyond; in these they may meet their seniors.

Tests for Four-Year-Olds

At four years, now reaching maturity, the colt or filly will run in handicap or conditions races (at fixed weights, often varied by penalties or allowances) at distances suitable to capacity. There are sequences of races designed to test four-year-olds, but the Gold Cup at Ascot (2½ miles), the Eclipse Stakes at Sandown Park (1½ miles), and the Autumn "cup" races, *e.g.* at Doncaster, may be cited as appropriate missions for high-grade horses. There are also important races, throughout the season, for sprinters. Despite a modern tendency to specialisation, the 19th century pattern may still be regarded as the Jockey Club's idea of what a good racehorse can do.

As an example may be given the record of Isinglass, 1892-95. Only once beaten, this model racehorse was foaled in 1890. At two he won a maiden plate at Newmarket, the New Stakes at Ascot, and the Middle Park plate at Newmarket. At three he won the Two Thousand Guineas, the Newmarket Stakes, the Derby, and the St. Leger. At four he won the Eclipse Stakes, the Princess of Wales's Stakes, and the Jockey Club Stakes. At five he won the

Ascot Gold Cup. His total winnings of £57,455 constituted a record. Many racehorses have completed their careers without being defeated. Eclipse never lost and never paid forfeit; Ormonde and St. Simon are other instances; a modern example is Bahram, triple crown winner of 1935.

Prize Money and Forfeits

Rewards, in the form of prize money, to the owner of a good horse are considerable. The Derby may be worth over £10,000; the St. Leger, Eclipse Stakes, and Ascot Gold Cup are similarly valuable events. Prize money for these four events in 1938 was respectively £9,229, £10,465, £8,868, and £7,600, not record figures. Prizes vary according to the entrance money contributed by owners; the system provides for forfeit stages, by which owners entering their horses may withdraw them at certain dates, the forfeited stakes going to the general pool. In Blue Peter's Derby (1939) 116 owners declared forfeit of £5 each; 110 at £25; 62 at £50. Owners whose horses remained in the entry paid £100 each. Further financial rewards accrue to owners of first class horses that are retired to the stud.

Conditions of races are varied so as to give winning chances to horses of all ages, classes, and capacities. Maiden events are designed for two-, three-, and occasionally four-year-olds that have not won, either at starting or by specified dates. Winners may be set to carry extra weights up to 14 lb. The classic races are run at equal weights, with the concession that fillies carry slightly less than colts. In other races, weight-for-age terms are imposed, based on a scale introduced by Admiral Rous in 1873. Weights include the bodily weights of the riders, adjusted by the placing of lead beneath the saddle cloths. The standard weight (for colts) in the classic races and other important events is 9 st. Handicap races are arranged for all types of horses, according to their estimated relative merits, the highest weight allotted being not less than 9 st. 7 lb. and the lowest 6 st. 7 lb. There are also selling races, the winners of which are sold on the spot at public auction. Races are graded in distance, the shortest being 5 furlongs and the longest approximately 2¾ miles. A horse carrying 9 st. at Ascot will do well to cover 5 furlongs in just over a minute, a mile in 1½ mins., or 2 miles in 3½ mins. Some courses are faster, among them Epsom,

where the Derby (1½ miles) was won in 2 mins. 33½ secs. by Mahmoud in 1936.

The cost of racing depends on the type of horse and the sort of races in which it runs. A rough estimate for an average racehorse based on the comparatively stable period 1930-39 would be £300 per annum in training fees and a similar sum for entrance fees forfeits, etc. All costs rose during and after the Second Great War. Owners are divided into two main classes: those who breed their own horses, maintaining private training stables, and those—the great majority—who buy yearlings and place them with public trainers.

There were in England in 1945 approximately 225 trainers, with establishments varying from two or three horses to 60 and over. The bulk of the training stables are concentrated near Newmarket, in the Berkshire and Wiltshire Downs, and in Yorkshire. Most gallops or training areas are used communally, individual trainers paying annual fees per horse, to cover maintenance costs. Trainers employ apprentices and a larger proportion of stable hands; it is usual for one stable hand to groom and ride at exercise a minimum of two horses.

Jockeys' Emoluments

Jockeys, licensed by the Jockey Club, are as a rule paid retainers by individual owners or trainers. Fashionable and successful jockeys may have several retainers. The official scale is 5 guineas for a winning, 3 guineas for a losing, ride. First-class jockeys, however, receive retaining fees running well into four figures and occasional presents in addition. The profession may be lucrative, but the work is extremely arduous and perhaps accompanied by the need for fasting in order to keep riding weights within limits.

The supreme authority in racing is the Jockey Club (*q.v.*) whose rules, first published in 1857, are substantially followed in every country in the world.

The control of racing, within the framework of the rules of racing, is exercised (a) by the stewards of the Jockey Club at meetings conducted by them, *e.g.* at Newmarket; (b) by local stewards appointed by racecourse executives. Racecourses, which must be licensed by the Jockey Club, may be privately owned, or managed by municipal bodies (*e.g.* Doncaster); the majority are profit-bearing concerns but sometimes profits go back to prize money or improvements of stands.

Officials, apart from the stewards, consist of paid secretaries, clerks of courses, and of the scales, handicappers, judges, stakeholders, starters, and club secretaries. Medical and veterinary officers are appointed to all courses. An inspector of courses is nominated by the Jockey Club.

Betting is conducted on racecourses by bookmakers and through the totalisator (*q.v.*). The bookmakers, who pay higher charges for admittance than the general public, are accommodated in an enclosure popularly known as Tattersall's Ring, where they conduct their lawful business; there is cheaper accommodation for them, and for the public, in the Silver Ring. A vast amount of off-course business is done by starting price offices in the towns, bets being made by telephone and other means on credit. Cash betting away from racecourses is illegal.

Racing in England in 1946 was conducted on 33 courses, and in Scotland on four. In the same year a total of 3,017 horses competed in Great Britain for 1,985 races, of which 1,195 were for two-year-olds. The total prize money competed for was £755,683.

Racing During Wartime

During the Second Great War most racecourses were taken for national purposes and racing was confined to a very few. By permission of the government, part of Newmarket Heath was kept open for racing and training purposes; substitute classic races were decided there. Racing was held only at Newmarket, Pontefract, Salisbury, Stockton, and Windsor in 1942, but other courses were brought into use as the military situation improved. The rationing of oats for racehorses was instituted in 1940 and was continued beyond the war. There was formed in 1942, at the instigation of the Jockey Club, a racing reorganization committee, whose terms of reference were to consider the whole future of racing in general and in particular the encouragement of owners and the greater comfort and convenience of the public.

Bibliography. History of the British Turf, J. Rice, 2 vols., 1879; History of Newmarket and Annals of the Turf, J. P. Hore, 3 vols., 1886; The Racing World and its Inhabitants, A. E. T. Watson, 1904; History of the Racing Calendar and Stud-Book, C. M. Prior, 1926; Flat Racing, Lonsdale Library, vol. xxviii.

Horseradish (*Cochlearia armoracia*). Edible rooted perennial of the family Cruciferae. Probably a native of Central Europe, it has been cultivated from the earliest times, and is naturalised in Great Britain. It has flower stems about 2 ft. high surmounted by white flowers, large oblong basal leaves



Horseradish. Leaves and edible root of this vegetable

on long stalks, and lance-shaped stem leaves. Its cylindrical white root is used as an adjunct to roast beef, and in sauces. It is readily propagated by division of roots in any soil or position, but the best soil yields the hottest flavoured horseradish. Horseradish beds should be cleared out and replanted at intervals of three years, otherwise they tend to undermine neighbouring crops.

Horseshoe Fall. The Canadian section of the falls of Niagara (*q.v.*), separated by Goat Island from the American Fall. Horseshoe Fall is 158 ft. high, with a crest of 2,600 ft. in a long curve.

Horse Show. Public exhibition of horses, usually held under the auspices of some society. Prizes are given, on the advice of qualified judges, for the best animals. The most famous show is, perhaps, the one held at Ball's Bridge, Dublin, every Aug. The International Horse Show takes place annually, usually at Olympia, London. Other shows are for particular classes of horses, *e.g.* the Shire Horse Show is held at the Agricultural Hall, Islington, and there are shows for hunters, ponies, etc.

Horsetail (*Equisetum*). Genus of Pteridophyta of the family Equisetaceae (*q.v.*). Horsetails are natives chiefly of the N. temperate regions, a few species sub-tropical. They are the only surviving representatives of the trees of carboniferous times. They have creeping rootstocks and erect, hollow,

jointed stems (solid at the joints). They are coated with silica so completely that lengths may be found in ponds and ditches from which all the soft parts have been dissolved out, but the form is still perfect. Hence some species have long been used for scouring and polishing, and Holland exports Dutch rushes (*E. hyemale*) from dykes and canal banks for this purpose. See Botany.

Horse-trappings. Objects for controlling and decorating horses in peace and war. Swiss lake-dwellers used staghorn cheek-bars, with twisted thong or rope mouth-pieces. In the Bronze Age the twist reappeared in metal, unjointed or jointed; late-Celtic iron bits were often bronze-plated. Gold and silver trappings abound in Scythian graves. British sites—Polden Hill in Somerset, Stanwick in Yorkshire, and Hunsbury in Northants—yield bronze and iron bits, cheek-pieces, frontals, terrets, and rings. Tiny bronze bells from Dowris, Offaly, were probably harness jingles. At Goblin Hill, Flintshire, a Bronze Age cist contained a richly engraved gold pony-corslet. Most early British enamelling is associated with horse-furniture. See Bronze Age.

Horsforth. An urban dist. in the West Riding of Yorkshire, England. It stands on the Aire, 5 miles N.W. of Leeds, and is served by two railway lines. It is mainly residential, but bleaching and the manufacture of woollen goods are carried on. Pop. (1951) 14,105.

Horsham. An urban dist. and market town of W. Sussex, England. It stands near the head of the Arun, 38 m.

S.S.W. of London on the electric rly. The church of S. Mary, an Early English structure, with Perpendicular windows and a shingle spire, has a tower that dates from 1247; it contains several fine monuments; some are of the Shelley family, the poet having been born 1½ m. away. There are a town hall, an old grammar school in a modern building, and an exchange. At Carfax, in the centre of the town, is an iron ring, the surviving relic of bull-baiting. In the Causeway are gabled houses. Tanning and milling are industries, and there is a trade in agricultural produce. Horsham was already an important



Horsham arms



Horsham, Sussex. The Causeway, with S. Mary's church, the tower of which dates from 1247

place in the 12th century. Later gloves were made here. From 1295 to 1885 separately represented in parliament, it now gives its name to a co. constituency. Market day, Wed. Pop. (1951) 16,682. Near is Christ's Hospital (*q.v.*).

Horsham. Town of Victoria, Australia. It stands on the Wimmera river, and on the main line between Melbourne and Adelaide, 203 m. W.N.W. of the former. It is the commercial centre for the district and has irrigation works. Pop. 5,600.

Horsley, Sir Victor Alexander Haden (1857-1916). English surgeon. Born at Kensington, April 14, 1857, he graduated from University College, London. During 1891-93 he was Fullerian professor at the Royal Institution; from 1886 surgeon to the National Hospital for Paralysis and Epilepsy; and from 1906 consulting surgeon at University College Hospital, where he made a reputation as practitioner in facial surgery. He was knighted in 1902. In 1916 he went to Mesopotamia (Iraq) as consultant to the British forces, and issued a strong indictment of the medical organization there, but died of heat-stroke, July 16. He was an advocate of temperance and women's suffrage.

Horst. High ground which owes its elevation directly to fault movements. Horsts are commonly elongated ridges bounded on either side by faults. They may have been pushed up from below, or the ground level on either side may have been lowered by vertical earth movements; See Earth Movement; Fault.

Horst Wessel Song. German Nazi party anthem. It was written by a young Nazi, Horst Wessel, who, according to the party, had been killed in a fight with Communists, but had actually met his death in a public-

house brawl. The air of the song, which was sung at the close of all official proceedings, was adapted from a German Communist party song, itself borrowed from a Salvation Army hymn.

Hort, Fenton John Anthony (1828-92). British theologian. Born in Dublin,

April 23, 1828, he was educated at Rugby and Trinity College, Cambridge. After distinguishing himself in several fields of scholarship, he was ordained 1854 and was a Hertfordshire vicar, 1857-72. In 1872 he became fellow and lecturer of Emmanuel College, Cambridge, in 1878 the Hulsean professor of divinity, and in 1887 the Lady Margaret lecturer in divinity. He died Nov. 30, 1892.

Hort is chiefly known for his work on the N.T., in which he was associated with Westcott and Lightfoot. One of the committee appointed to revise the text of the N.T., with Westcott he published the edition on which the R.V. was largely based; his introduction is an outstanding piece of critical scholarship. *Consult* Life and Letters, ed. Sir A. Hort, 1896.

Horta. Seaport of the Azores and capital of the island of Fayal, giving its name to a district. It possesses a good harbour, wireless station, and coaling facilities. Pop. 7,000.

Horten. Seaport of Norway, in the fylke or co. of Vestfold. It stands on the W. shore of Oslo Fjord, almost opposite Moss, 32 m. direct and 66 m. by rly. S. of Oslo. The adjoining Karl-Johansvaern is the chief Norwegian naval arsenal. There are ship-building yards, an observatory, and a nautical museum. Pop. 10,775.

Hortensius, Quintus (114-50 B.C.). Roman orator. A supporter of the aristocratic party, he held various high offices, including the consulship in 69. A representative of the Asian or bombastic style of oratory, and noted for his retentive memory, he was considered the greatest advocate of his time until surpassed by Cicero. He defended Verres (*q.v.*).

Horthy de Nagybanya, Nicolas Vitez (1868-1957). Regent of Hungary, 1920-44, Horthy was born at Kenderes, June 18,

1868, and educated at the naval academy of Fiume. After having commanded the Austrian fleet towards the end of the First Great War, he organized a White Army to fight the Hungarian soviet republic. The Communists were defeated, and Horthy assumed the title of administrator of the realm in 1920. Although he fostered friendship with Germany and Italy, he became neutral in 1939; but Hungary's adherence to the Tripartite Pact of Nov. 19, 1940, made her a satellite of the Axis powers.

When Hungarian troops invaded Yugoslavia on April 11, 1941, Horthy issued a justification. In Sept. Hitler and the regent conferred at the



Admiral Horthy, regent of Hungary

former's headquarters, with the result that Hungarian troops were sent to the Russian front. On Feb. 16, 1942, Horthy nominated his son Stephen as deputy-regent, but the latter was killed on the Russian front in Aug. The regent asked for armistice terms on Oct. 15, 1944, and was deposed next day, being transferred to Germany. He was captured at Weilheim, Upper Bavaria, by the U.S. 7th army on May 1, 1945. Imprisoned at Nuremberg, he was released, again arrested at the request of Yugoslavia, held until 1948 when he went to Portugal, where he died Feb. 9, 1957. *Consult* Memoirs. English translation, 1956.

Horticultural Society, Royal. Association established in 1804 to collect information about the cultivation of plants and trees and to encourage every branch of horticulture. It established a journal in 1807, and was incorporated in 1809. The society's offices, library, and an exhibition hall are in Vincent Square, London, S.W.1; there is another exhibition hall, opened 1928, in Greycoat St., S.W.1. It has gardens at Wisley, Surrey, inaugurated in 1904, where experiments are carried out, a laboratory, and a school of horticulture. The society has more than 48,000 fellows, and more than 2,000 affiliated societies.

Horticulture (Lat. *hortus*, a garden; *cultura*, cultivation). The term under which are grouped all methods of gardening as practised in private, public, botanical, market, and experi-

mental gardens and plant nurseries. It embraces the cultivation of ornamental trees and shrubs, tree, bush, and cane fruits, vegetables, hardy and half-hardy flowering plants, alpiners, plants suitable for the greenhouse and conservatory, and flowers and vegetables for the production of seeds.

Commercial horticulture is an industry employing large numbers of men and women in growing fruits, vegetables, and flowers for the markets, and in nurseries where plants are propagated on a large scale. Another important business is cultivating flowering plants and vegetables for the seeds used by professional and private gardeners. Horticulture since the beginning of the 20th century has become highly specialised. Public parks and gardens, a feature of all large towns, are under the care of superintendents who have undergone special training.

Courses for students of horticulture are held in the Royal Botanic Gardens, Kew; the Royal Horticultural Society's gardens at Wisley; Wye college; and the women's college at Studley. Experimental work is carried on at the John Innes horticultural institution, Herts; E. Malling and Long Ashton research stations; Neale-Hayne College; and Reading university. Insecticides and fungicides have been improved by researches carried out by horticultural chemists. The national diploma in horticulture, equivalent to a degree in gardening, is awarded by the Royal Horticultural Society. Flower societies further the production of special blooms, fortnightly exhibitions are held in London by the R.H.S., and horticultural shows draw crowds to Southport, Shrewsbury, Edinburgh, and Leicester. Botanical exploration has enriched the British collections of plants with introductions from China, Assam, Burma, and other countries. New and improved fruits, flowers, and vegetables have been raised by hybridisation in garden or nursery.

Horton, Robert Forman (1855-1934). British Congregationalist divine and writer. Born in London, Sept. 18, 1855, he was educated at Shrewsbury school and New College, Oxford. In 1880 he accepted an invitation to become minister of a new church, formed by the Congregationalists at Hampstead. A building was erected in Lyndhurst Road, and Horton soon won

a reputation as a preacher and as an organizer of social activities. In 1903 he was chairman of the Congregational Union. Although a D.D., he regarded himself as a layman, his attitude being that a separate priesthood was unnecessary. He became known as a theologian, taking somewhat advanced views on the inspiration of the Bible. His writings include *Inspiration and the Bible*, 1888; *The Teaching of Jesus*, 1895; *Oliver Cromwell*, 1897; *The Hero of Heroes*, 1911; *Autobiography*, 1917. Retiring in 1930, he died March 30, 1934. A *Life* by A. Peel appeared in 1937.

Horus. Egyptian deity. Hawk-headed, he was perhaps the totem of a hawk clan, whose victory originated the Horus-name borne by the dynastic kings, afterwards being deemed a sun-god, the son of Ra, or of Isis and Osiris. His struggle with the god Set was a favourite theme of religious literature. See Haroeris; Harpoerates; Set.

Horvath, Mihail (1809-78). Hungarian historian and statesman. Born at Szentes. Oct. 20, 1809, Horvath was ordained, became professor of Hungarian at Vienna in 1844, and was appointed bishop of Csanad in 1848. An ardent supporter of Hungarian independence, he was made minister of public instruction and worship after the rising of 1848, but after the Hungarian defeat was forced into exile. Although condemned to death, he returned under the amnesty of 1867, and later entered the diet, a supporter of Deák. He died at Karlsbad Aug. 19, 1878. Among his historical works are *History of the Hungarians, 1842-46*; *History of Hungary, 1859-63*.

Horwich. Urban dist. and town of Lancashire, England. It is 5 m. W. by N. of Bolton, on the railway. There are large locomotive works here.



Horwich arms

Rivington Pike (alt. 1,190 ft.). Pop. (1951) 15,532.

Hosanna. Word derived from the Hebrew *hoshēa na anna*, Save (us) we pray (Ps. 118). From the use of the words Save, we pray, used on that occasion, the last day of the feast of Tabernacles was

known as the Great Hosanna. The word Hosanna, which acquired a kind of liturgical use as an exclamation of praise, was shouted by the assembled crowd as our Lord entered Jerusalem on Palm Sunday (Matt. 21, Mark 11, John 12). A kind of equivalent to the Roman *Io triumphe!* it is retained in the Sanctus of the Mass, and is used in the hymns for Palm Sunday.

Hose. Covering for the legs and feet. The term formerly included the breeches or chausses when both were a single garment. Early in the 16th century the two became separate articles, the upper part being known as the upper stocks or trunk hose, and, later, breeches, and the lower as the nether stocks, and afterwards as stockings (*q.v.*). See Hosiery.

Hose. Flexible pipe for the conveyance of fluids, often between a fixed and a moving point. The principal types of hose are: (1) plain rubber, or rubber reinforced with layers of canvas; (2) canvas; (3) leather with riveted seams; (4) armoured, consisting of rubber or canvas protected from wear and sharp bends by wire wound spirally round it from end to end. For high pressures of liquids or gases the walls are specially strengthened. Suction hose is that through which a fluid is drawn by suction; it is protected from collapse by extra-rigid wall construction, or by a wire wound layer.

The principal uses of hoses are in connexion with water, *e.g.* a garden hose, fire-engine hose, and water crane hose for watering locomotives; with oil, as for connecting the pumps of an oil-tank steamer to an oil-pipe line; with petrol, *etc.*, in filling the tanks of motor vehicles from a pump; with steam and air, as applied to the steam and air connexions between the vehicles of a train; with air for the power supply to pneumatic tools, and in sandblasting, cleaning, *etc.*

Hose reels are revolving drums upon which lengths of *e.g.* garden hose or fire-engine hose are wound. Hose connexions, where high pressures occur, are made by flanged and bolted joints; for coupling the flexible hose pipes on the brake system between railway vehicles a clip is attached to the end of each length. By placing the two clips together and giving them a part turn, they are quickly coupled together.

Hosea. One of the minor prophets of the O.T. He was a son of Beeri, and was born in the Northern kingdom of Israel, or

which he is the only prophet whose utterances have survived in book form. He flourished in the reigns of Uzziah, Ahaz, and Hezekiah, and of Jeroboam, king of Israel.

The first three chapters of his book consist of a parable, related as a personal incident, which symbolises the exile of Israel and its restoration. The remaining chapters contain a series of prophecies, evidently of different periods, in which Hosea laments the immorality and idolatry of the people and their political strifes. He strongly emphasises the love of God for His people, and the fact that He demands loving-kindness rather than sacrifice. In this Hosea introduces a new note into Jewish theology. His style is obscure, and the book as we now have it appears to contain many later interpolations.

Hoshangabad. District and town of Madhya Union, India. The district has a number of cotton ginning and pressing factories. Wheat is the principal crop, the exports consisting mainly of agricultural produce, and the imports salt, sugar, and rice. Hoshangabad town is a local trade centre. Area of district 5,707 sq. m. Pop. (1951) district, 847,898; town (est.) 15,000.

Hoshiarpur. District and town of Punjab state, India. The Beas and Sutlej rivers form part of the boundary of the dist. of which the chief crops are wheat, gram, and maize, and the chief industry is the manufacture of cotton goods. The tribes inhabiting it are Jats, Rajputs, and Gujars. Area of district 2,195 sq. m. At the town of Hoshiarpur are two colleges of Punjab University. Pop. (1951) district, 1,091,986; town, 45,291.

Hosiery. Knitted goods of all kinds. In hand-knitting a loop is formed upon a plain needle and is caused to intersect with another loop, the work continuing one stitch at a time in horizontal rows, a fabric of interdependent loops being the result. In 1589 the Rev. William Lee, of Calverton, Notts, introduced his knitting frame for forming a whole row of loops at one operation. The thread was laid along a row of horizontal needles made of spring wire and hooked at the ends. The thread was pressed by the action of sinkers into loops hanging between each of these needles and was simultaneously slipped under the beads or hooks of the needles. The loops of the previous row were then pushed over the closed beads and thus over the ends of the needle, making a continuous flat web of

fabric, capable of being sewn into tubular and other shapes.

These main principles are still observed, although important additions have been made. Moses Mellor of Nottingham adapted the knitting frame to rotary principles. Means of narrowing or fashioning the fabric were added, and eventually vertical needles were employed and seamless stockings were then made. William Cotton's rotary frame has been chiefly instrumental in enabling high class fashioned hosiery to be produced at little cost. Townsend's needle carrying a small hinged latch, invented 1856, facilitated the production of cheap and fancy goods. Warp knitting machines, forming vertical rows of loops intersected between threads stretched warp-wise, make both plain and fancy fabrics. Knitting machines of a high automatism turn out fully fashioned stockings in various stitches requiring only to be cut apart and seamed at the toe; also multicoloured and patterned fabrics of the fair isle type.

Hosiery goods are made to certain gauges, the gauge being the number of needles in one inch, and in several materials, chiefly wool, cotton, and silk. Undergarments such as singlets and drawers are the principal product. In addition to hose, knitted coats, sweaters, jerseys, gloves, neckties, caps, shawls, and waistcoats are made extensively. Leicester is the principal seat of the British industry; a high class of goods is made in Nottingham; Hawick is the chief centre in Scotland. Articles are hand-knitted for sale in N. Scotland and command higher prices

than similar machine-made goods. The knitting of cheap cotton articles is carried on in Saxony, U.S.A., and Japan. *See Knitting.*

Hoskins, JOHN (d. 1664). English miniature painter. Employed at the court of Charles I, he executed miniatures of the king and queen, the countess of Dysart, and others of the royal entourage. Alexander and Samuel Cooper were among his pupils. He is credited with some early portraits in oils. *See Miniature.*

Hosmer, HARRIET GOODHUE (1830-1908). American sculptor. Born at Watertown, Mass., Oct. 9, 1830, daughter of a doctor, she studied art in Boston; and later in Rome, where most of her life was spent. Her sculpture, in spite of a certain coldness of feeling, shows considerable structural sense. Examples are to be seen in the Metropolitan Museum of New York, and at St. Louis, while at Ashridge Park, Herts, are gates made after her designs. She died at her birthplace, Feb. 21, 1908.

Hospice (Lat. *hospitium*, place of entertainment). House of shelter for travellers in a dangerous country. The best known hospices are in the Swiss Alps, instituted probably for the sake of pilgrims going to and from Rome and maintained by monastic orders. The Great St. Bernard hospice, founded in 962, is noted for its rescues of travellers overtaken by cold and the breed of dogs trained to the work. Others are the St. Gotthard, started in the 13th century, the Simplon, the Little St. Bernard, and the one on Mont Cenis. Homes for the destitute and sick are also called hospices.

HOSPITAL: HISTORY AND TYPES

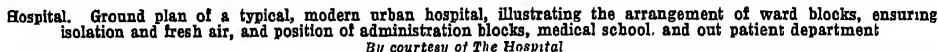
H. A. J. Lamb, A.R.I.B.A., Former Editor, Hospital Management

In addition to this general sketch there are articles on all the great hospitals, e.g. Guy's, London, St. Bartholomew's. See Ambulance; Medicine; Red Cross; and the articles on Diphtheria; Tuberculosis; and other diseases; also Hôtel Dieu

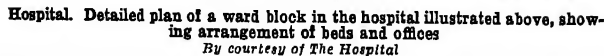
The art of healing and the care of the sick has, during the greater part of the known history of the world, been associated with religion, or what stood for religion. The Asklepiadae, the supposed descendants of Asklepios (Latinised as Aesculapius), who was worshipped as a god by the Greeks, were an order or caste of priests. The knowledge of medicine was regarded as a sacred secret to be transmitted from father to son in these families.

Hippocrates (c. 460-377 B.C.), celebrated physician of antiquity, in his famous professional oath, swears by "Apollo the Healer, and

by Asklepios, and all the gods and goddesses." In Cairo Museum is to be seen a sepulchral stèle of a physician to a royal hospital of the time of the Pharaohs. At Philae, a part of the temple was dedicated to I-em-hotep, whose name in later times became synonymous with Asklepios, but, generally speaking, the mental attitude of the pagan world to the sick was indifferent or actively selfish, and, although the sick betook themselves to the temples for cure, a hospital in any shape approaching modern institutions was not established until some time after the beginning of the Christian era.



Among those whose work has most helped to perfect hospitals during the 19th century must be mentioned Joseph Lister and Florence Nightingale. Lister worked in the direction of the prevention of septic infection of wounds, and instituted a treatment which has had a lasting effect on the practice of his profession generally and the surgical side of hospital work. Florence Nightingale, the pioneer of modern nursing, revolutionised the nursing side of military hospitals, and her work has greatly influenced the nurse-training schools of hospitals.



After the dissolution of the monasteries, hospital service in England was in abeyance. Before his death, Henry VIII restored S. Thomas's and determined to give back S. Bartholomew's, which was refounded in 1553. Bethlehem, Christ's Hospital, and Bridewell were also restored about the same date. There was but little increase in the number of hospitals until the 18th century, when the follow-

As of special importance in connexion with the art of healing and the perfection of hospital practice must be mentioned the discovery of methods of obtaining anaesthesia and the application of light, radio-activity, and electricity for diagnostic purposes and treatment. The property of X-rays has proved of the highest importance in medicine and surgery, and its employment is one of the leading features of institutional work, especially in mass miniature radiography for the detection of tuberculosis among industrial workers. In the

modern hospital, treatment under these branches and remedial massage are widely used.

Voluntary hospitals have existed for centuries and have distinguished themselves by quality of work and initiative. Their constitution is flexible; they provide an atmosphere in which individual effort and enterprise can flourish. Under their aegis, and through their training schools, British medical and nursing professions have reached a high standard. Hospitals like Guy's, the London, S. Bartholomew's, and S. Thomas's—the last very seriously damaged by bombs in 1940—are household names in Great Britain.

Mental Hospitals

Except in a few instances, voluntary hospitals have not been provided for mental, chronic, or infectious cases. But as regards mental hospitals, the Society of Friends founded about 1791 the Retreat at York. Then humane methods of treatment began. In 1808 an Act gave authority for the provision of asylums. But it was not until Lord Shaftesbury intervened on behalf of these unfortunate people, becoming chairman of a lunacy commission in 1834, that progress was made. His energies laid the foundations of the Act of 1890, which is the basis of administration of mental hospitals today. In 1930 a more progressive Mental Treatment Act was passed, and further reforms can be effected under the National Health Service Act, 1946. Mental hospitals are arranged on the villa system, separate units, separately staffed, being scattered in enclosed parkland. This arrangement permits of patients of similar type being nursed together.

Hospitals under local public government have developed since the passing of the Local Government Act, 1929, and to meet the needs of war casualties, both civilian and service. The number of general patients in them exceeds the number in voluntary hospitals, and they are almost wholly responsible for patients suffering from mental and infectious complaints.

In France, Germany, Scandinavia, and other W. European countries, voluntary hospitals are provided both by religious and philanthropic bodies, and in the countries with large R.C. populations many hospitals are staffed by religious communities. In the U.S.A., broadly, hospitals take in all classes of the community, the wealthy, in private or semi-private wards, contributing a sum which

with other resources helps others to secure benefits at a low charge or free. In Canada many hospitals are maintained on the same lines as in the U.S.A., but a number receive a state grant and payments are made by municipalities towards maintenance of patients. Each Australian state has its own method of dealing with the question, but there is one point of resemblance—all hospitals are more or less dependent upon the state government for funds. New Zealand municipal bodies have a voice in the management of hospitals, and, with the government, find the bulk of the funds.

The disadvantage of building hospitals in populated surroundings is apparent. To avoid noise, it is desirable that they be sited on the outskirts of towns, with ample grounds for future expansion. Transport facilities are important. All hospitals should be easily accessible by road and rail. Buildings should be designed to inspire confidence and cheerfulness, with strong clean lines and large windows, relying for effect on mass and not on detail. Patients now go to hospital in order to get well, not to die.

Vertical Planning

Ideals in planning hospitals are flexibility in the disposition of rooms and walls, and few corridors with every care taken to eliminate noise. One method of flexible planning is the "grid" system of spacing units, with light movable internal walls that can be adjusted to suit new needs. For a large central hospital, vertical planning is probably best, especially if the foundations are on rock. It is also more economical. An outstanding event of 1938 was the opening of the Birmingham hospital centre (later named the Queen Elizabeth hospital), a striking example of vertical planning, with novel ideas in the arrangement of operating theatres. See Birmingham illus., p. 1175.

The number of beds to a ward varies, but 18 to 24 is common; the tendency being towards smaller wards, as more homely. There are two methods of placing the beds. They can either have heads against the outside wall, with an allowance of 100–125 sq. ft. per bed, or be placed parallel to the external walls in groups of four, with steel and glass screens dividing one group from the next. The principal advantage of this latter method is psychological. It also allows more window space. It was introduced into England at the Hertford

county hospital. Risks of cross infection can be avoided by having no communicating corridors, open balconies for patients, and corridors at the back for staff use.

The increasing use of X-rays necessitates more accommodation for equipment. Suites desirable are barium meal, enema, and heavy bone; chest; surgical unit; small bone and skull, and, when necessary, dental; film processing, viewing, reporting, and records; waiting and rest rooms. There should be dressing-rooms to every suite.

The kitchen is most important. Many hospitals have heat storage cookers with solid fuel, or draw-back ovens. Others have wall or central ranges for solid fuel, gas, or electricity. Wired glass hoods, with extract ducts, placed over cooking equipment draw off all cooking odour.

Walls and Floors

Rubber in vulcanised tiles is popular for flooring wards and corridors as it reduces noise. This also applies to cork linoleum, which is germ-resisting, but needs careful laying. Teak strip and wood blocks are also used. Sanitary suites and operating theatres should have hard floors of tile, or terrazzo. If laid with ebonite fillets, cracking is prevented. The walls should be finished with a hard plaster and glaze-painted, with tiled dadoes in some departments. Dust traps should be avoided, and doors should be flush panelled.

The disadvantage of many heating systems is the presence of pipes which harbour dust and disfigure walls. Panel heating is popular because of the absence of pipes; it consists of steel tubing concealed by ceiling or floor grids, through which hot air circulates.

Ward lighting may consist of pendants with diffused shades, and bedhead lights; or a combination of direct and indirect lighting. Skirting or floor lights for night use are desirable. Operating theatres should have a high intensity of shadowless light.

Sanatoria should be easy of access from the districts they serve, and sited in places free from fog and dust, though not necessarily among pine trees. Planning should be approached from the point of view of the medical superintendent and the ratepayer, as well as the patient.

Quarters for nurses and domestic staff should be homely and attractive, near the hospital, but screened from it, with own garden. It is usual to have separate rooms for the staff, and self-contained

flats for senior members. There is a growing demand, however, for senior members of the nursing and domestic staff to be allowed to be non-resident.

From the heavy scars borne by British hospitals after the Second Great War it may seem that the needs of the public can best be served by the establishment of health centres, in which the main features would be preventive medicine and social hygiene. Here there should be ample facilities for enjoyment, and bureaux for discussions on bodily health problems and maternity clinics. The clinic which signifies a special department of a hospital, *e.g.* that for treating venereal disease, should not be confused with a clinic provided for the welfare of the people. The word is of Greek origin, and referred originally to the bedridden person or inmate of a hospital. The ideal combination is found in Bristol, where health and public assistance committees coordinate their medical services and provide for their patients a central health clinic.

There are good arguments for and against voluntary hospitals being taken over and managed by a state department or under local government. The hospital point of view is that the voluntary system may be said to have a soul, every hospital-trained doctor, nurse, and social and other worker being imbued with the idea that the patient comes first. It is felt that a state or municipal system might possibly lead to more mechanical, less humane, administration and treatment.

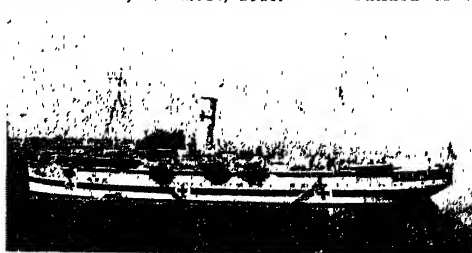
Yet, particularly since about 1912, national services concerned with the individual have been built up with increasing momentum. Greatest of these was the national health insurance scheme, which between 1912 and 1948 provided general practitioner service for all workers earning up to £420 per annum, and additional benefits over a limited and varying field. School medical and child welfare services were also brought into being. Hospital services were developed so as to isolate infectious sick. After 1930 the old poor law hospitals were brought within the administration of many local authorities.

A White Paper on a national health service appeared in 1944, and showed what was meant by a comprehensive service, how it would fit in with what had been done in the past, and what was being done. The change of govern-

ment in 1945 delayed legislation, but a bill providing for the establishment of a comprehensive health service became law in 1946. The administration of all hospitals, other than teaching hospitals, is entrusted to regional health boards. Each region is such that its services can be conveniently associated with a university medical school. Each board is required to appoint a local hospital management committee for each large hospital or related group of hospitals. Special arrangements are provided for hospitals or groups designated by the minister of Health as providing facilities for undergraduate or post-graduate clinical teaching. The general system does not cover the teaching hospitals, which have their own separate boards of governors, including members nominated by the university, the regional board, and the senior staff of the hospital itself. The cost of the scheme was previously estimated at £152,000,000.

Under the Health Service Act almost all voluntary and public hospitals were transferred to the minister of Health, July 5, 1948. This does not apply to the endowments of voluntary hospitals, which passed to a new fund. The service includes health centre and family doctor services, in which personal advice on health and treatment by doctors and dentists can be made at the patient's choice. Hospital and consultant services are made available not only at hospitals, institutions, and clinics, but also, where necessary, at health centres and the patient's home.

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Hospital Ship. H.M.S. Maine, one of the British hospital ships used during the Second Great War

Hospitallers, KNIGHTS, OR KNIGHTS OF S. JOHN OF JERUSALEM. Order founded or sanctioned by Pope Paschal II in 1113. Its nucleus was formed in the services of a hospital founded originally for tending pilgrims. To this hospital sun-



Hospitallers. Badge of the Knights of S. John of Jerusalem

dry ardent and self-denying spirits attached themselves after the capture of Jerusalem by the first crusaders. To the vows of celibacy, chastity, and poverty common to religious orders were attached vows of military service, primarily for the protection of pilgrims and ultimately for the defence of the Holy Sepulchre. Like the Knights Templars (*q.v.*) who were founded shortly afterwards, the order was joined by many men of birth and rank.

The two orders became rivals, both playing an active part in the history of the Crusades. But at the beginning of the 14th century the establishment of the Templars in France, England, and elsewhere was suppressed. In 1291 the Hospitallers were compelled to relinquish their hold upon Acre and to retire to Cyprus. In 1310 they captured Rhodes, which they held as the advance guard of Christendom against the Turks, until it was conquered by Suleiman the Magnificent in 1522. They retreated to Crete, whence they were transferred by Charles V to Malta in 1530; after which they became known as the Knights of Malta. They retained the island until the knights were dispersed when Napoleon took possession of it in 1798 on his way to Egypt, after which it passed into the possession of England. The existing English order is engaged in organizing hospital work. See Red Cross; S. John of Jerusalem.

Hospital Ship. Vessel used for the transport of the sick and wounded of the armed services.

In the Royal Navy such ships are often used as floating hospitals to receive and treat casualties until they are fit to return to duty, or, if their recovery is likely to be delayed, until they can be transferred to a base hospital. Nor-

mally the function of a hospital ship is to bring wounded to a base hospital or to return them to their own country. During the N. Africa campaigns of the Second Great War, hospital ships took wounded from the advancing battle to base hospitals in Egypt, as distance and road conditions prevented transport by land.

In peace only a few hospital ships are kept in commission. The wartime hospital ship is generally a passenger vessel converted for the purpose, with swinging cots, hoists for patients, and all the usual hospital equipment, dispensaries, and dressing, operating, and X-ray rooms. In size they range from small boats to ocean-going liners. The medical and nursing staff are provided by the army or the navy, according to whether the ship is administered by the war office or the admiralty. Navigation and engine room staffs are merchant navy personnel; no officers or other ranks of the fighting services may be carried except as patients.

By the Hague Convention of 1907, hospital ships must be painted white with a broad horizontal band of green; if supported by private individuals or societies, the band must be red. The ship must fly the Red Cross as well as her national flag. A later amendment requires large red crosses, which can be illuminated at night, to be fixed to decks and hatches, clearly visible to aircraft. When a hospital ship is lying in port or anchorage she must maintain black-out precautions. Hospital ships must not be used for any purpose of offence or of transport (except the transport of medical stores). Their names must be communicated to the belligerent states.

Although a signatory of the Geneva Convention, Germany repeatedly flouted its clauses relative to hospital ships in both Great Wars. At Dunkirk in 1940 and Anzio in 1943, hospital ships embarking Allied wounded were deliberately attacked by aircraft in daylight. Over 100 British hospital ships were in service in the Second Great War.

Hospital Sunday. Day on which traditionally the offertories collected at churches and chapels of all religious denominations are put into a fund for the benefit of all medical charities in the district. Collections made for specific institutions after appeal from the pulpit were for long customary. At Aberdeen since 1784 the con-

gregations of all denominations have devoted their alms on the first Sunday of the year to the Aberdeen Royal Infirmary.

Universal collections for voluntary hospitals are more recent. The credit for the first suggestion of one belongs to T. B. Wright, one of the proprietors of the Midland Counties Herald, who proposed it in an article in that paper, Oct. 13, 1859. Canon Miller, then rector of Birmingham, supported the scheme, to the elaboration and working of which he devoted much time and ability, being one of the honorary secretaries of the Hospital Sunday Fund, then started in Birmingham, from its commencement until his removal to Greenwich. The Wright Cottage Hospital at Perry Barr, Birmingham, and the Miller Memorial Hospital at Greenwich commemorate the connexion of those two men with the Hospital Sunday Fund movement, which very soon spread through nearly every English-speaking population in the world.

In 1872 Thomas Wakley, editor of the Lancet, urged on the lord mayor and clergy of London the duty of organizing a Metropolitan Hospital Sunday Fund, and as a result of a meeting at the Mansion House the fund was instituted, the first annual collection taking place June 15, 1873. This fund, with h.q. at the Mansion House, and with Queen Elizabeth II as patron, contributes to the maintenance of many hospitals and other medical charities which have not been nationalised, and provides nationalised hospitals with money for the use of the almoners in supplying such needs of poor patients as are not covered by public services.

Hospital Train. Railway train for the conveyance of sick and wounded in wartime. Early hospital trains were rough improvisations, but during the First Great War a high standard of equipment and comfort was reached.

Shortly before the Second Great War, the four main rly. companies in Great Britain undertook to equip for the war office ambulance trains for home and overseas use. In the first months of war, 12 home and 13 overseas ambulance trains were available; nine of the last, shipped to France, were lost in the retreat to Dunkirk. Ambulance trains were little used in the African and Pacific campaigns, but 66 were built at rly. workshops for the British and U.S. armies after D-day. Each train was equipped with furnished cars for travelling staffs of doctors.

nurses, and orderlies, kitchens and pharmacies, and wards for stretcher cases. The train crews were rly. employees, but the medical personnel were military.

In addition to the military ambulance trains, the rlys. provided 34 civilian casualty evacuation trains which were stationed at strategic points in the U.K. for the removal of civilians injured in air raids. As they were never needed for this purpose, most were transferred to the military authorities. A total of 925 vehicles were converted, and between June 6, 1944, and May 8, 1945, ambulance trains in Great Britain made 1,800 journeys. See Ambulance illus.

Host (Lat. *hostia*, victim). A term used in the Vulgate or Latin version of the Bible for the animal offered as a sin offering, burnt offering, or peace offering. In the R.C. Church the term is applied to the consecrated wafer, believed to be the Body of Christ, which in the Mass is offered as a sacrifice. It is used also of the bread before its consecration. It would appear that in the old Spanish liturgy the unconsecrated elements were known as *oblata* (things offered). The Greek Church uses unleavened bread, the R.C. a wafer of unleavened flour in the Church of England, while High Church practice favours wafer bread, the rubric enjoins the use of "the best and purest wheat bread that conveniently may be gotten." See Communion, Holy; Eucharist; Mass; Real Presence; Transubstantiation.

Host. In pathology, the animal or plant upon which a parasite lives. Parasites usually produce disease in the host, completely destroying the ichneumon fly and certain caterpillars, impeding the growth of others. The mistletoe is a well-known plant parasite, its host being usually the apple tree. In wheat rust, wheat is the host, rust a parasite. See Parasite.

Hostage (old Fr., mod. *otage*). In war, a person held by one of two belligerent forces as security for the performance, or the non-performance, of specified acts by the other. The practice, universal and of immemorial antiquity, was an obviously convenient method in former times of securing faithful and prompt fulfilment by the vanquished of conditions imposed by the victor. At first, no doubt, it was employed to prevent procrastination in completing surrenders and in negotiating terms of peace, but the Romans extended this use and held hostages of rank as guarantee for the continued loyalty of

subjected peoples. Modern European powers, Great Britain among them, have employed the same method in dealings with less civilized races, but as between civilized powers hostages have not been held for the performance of treaty obligations since the middle of the 18th century. Hostages are now usually taken only by invading troops as a preventive measure against hostile action by the non-combatant population of occupied areas, and as security for the payment of levies or fines imposed upon towns or districts by the occupying enemy.

The taking and execution of hostages were revived in their most barbarous forms by the Germans during their occupation of European countries from 1940. Local inhabitants were arrested and held as hostages for the cooperative behaviour of their compatriots compelled to work for the German war machine. In the event of sabotage, a number of hostages would be executed. When any German official or collaborator was assassinated by patriots, prominent citizens would be arrested, and some each day executed until the persons responsible for the assassination surrendered or were handed over. During the German occupation of Norway, some 10,000 Norwegian hostages were executed for sabotage or cooperation with the Allies; 7,000 people were similarly killed in Belgium. These figures were far outnumbered in the mass slaughter of hostages in France where up to 100 persons were regularly slain as reprisal for the murder of one German soldier. Mass execution of hostages also took place in Russia and Italy during the occupation.

Hoste, SIR WILLIAM (1780-1828). British sailor. Born at Ingoldisthorpe, Norfolk, Aug. 26,

1780, he entered the navy at thirteen. He served under Nelson, who "treated him as a son." He was present at Toulon, Cape St. Vincent, and the Nile. In 1805 Nelson moved him to the Amphion, but he



From an engraving

was at Algiers when Trafalgar was fought, and was "almost overwhelmed" at having missed the action and lost his friend. In 1808 Hoste took the Amphion to the

Adriatic, where he carried on a vigorous campaign against French merchantshipping as well as against war vessels, winning particular glory off Lissa, March 13, 1811, when he decisively defeated the greatly superior French and Venetian frigate squadron under Dubouidien. In the Bacchante he sailed again to the Adriatic, where he resumed his independent activities; in the land attack on Cattaro, on Jan. 5, 1814, he especially distinguished himself. He was made a baronet that year, and died Dec. 6, 1828.

Hostel (Lat. *hospitium*, place of entertainment for strangers). An inn. The use of the word in this sense was revived by Sir Walter Scott, in his romances, but is only literary. It is an old name for small unendowed colleges at Oxford and Cambridge, and has been adopted for various residential institutions for nurses, and students and workers of both sexes, run on semi-philanthropic lines, and not primarily for the profit of the promoters and managers. Hostels are provided in London and the provinces by the Y.M.C.A., Y.W.C.A., and other organizations, where young men or women of good character can obtain board and lodging at reasonable cost. During the Second Great War most religious, social, and youth organizations maintained hostels for British, Dominion, and Allied troops on leave or on transit through towns. Most were operated in conjunction with canteens. Hostels were maintained by the British government in industrial centres for the accommodation of directed labour. See Youth Hostel.

Hot Air Engine. External combustion engine that utilises the expansive force of heated air. There are two types, the Stirling and the Ericsson (Fig. 1). In the former the heated air is extracted and fresh air supplied for each cycle of the stroke; in the latter the same heated air is used over and over again, being passed through a metallic regenerator.

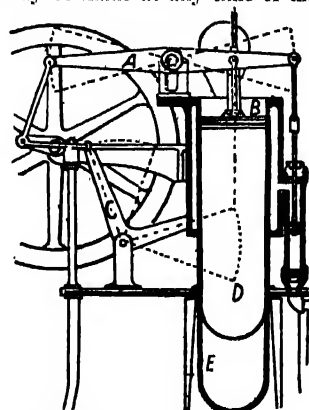
A regenerator hot air engine, the most efficient, has two vertical cylinders; the power cylinder, in which the air is heated, and the displacer cylinder. In each cylinder is a plunger connected by a coupling rod to a crank at each end of the flywheel shaft. The cranks are set at right angles, so that when one plunger is at the end of its stroke, the other is near the middle of a stroke. Beneath the power cylinder is a fire to heat

the air, and between the power and displacer cylinders is a passage containing the regenerators. The hot air travels along the passage between the two cylinders and as it expands moves the displacer cylinder, converting the movement into work. As the air in the displacer cylinder cools, its volume is reduced and it passes to the power cylinder through the regenerator, where it is reheated and used over again.

Originally called calorific engines, hot air engines were invented early in the 19th century, but on account of their bulk, slow speed, and inefficiency of the external heating apparatus, they have been rapidly displaced by gas, oil, and steam engines.

During the Second Great War Dutch engineers designed an engine with an efficiency some six times greater than that of the old type. By the employment of new steel alloys, the defects of burning and leaking hitherto detracting from the efficiency of hot air engines were overcome, and it was possible to reduce their great bulk. The Dutch engines drove generators for radio sets, and, capable of 3,000 r.p.m., were silent, vibrationless, and almost free from wear. For their particular class of work they proved more efficient than internal combustion engines (see Fig. 2, next page).

Hotbed. Name given to the contents of a garden frame, when the subsoil or bottom layer of the material is composed of animal manure, the decomposition and fermentation of which create artificial heat, useful for forcing and stimulating plant life. Hotbeds may be made at any time of the

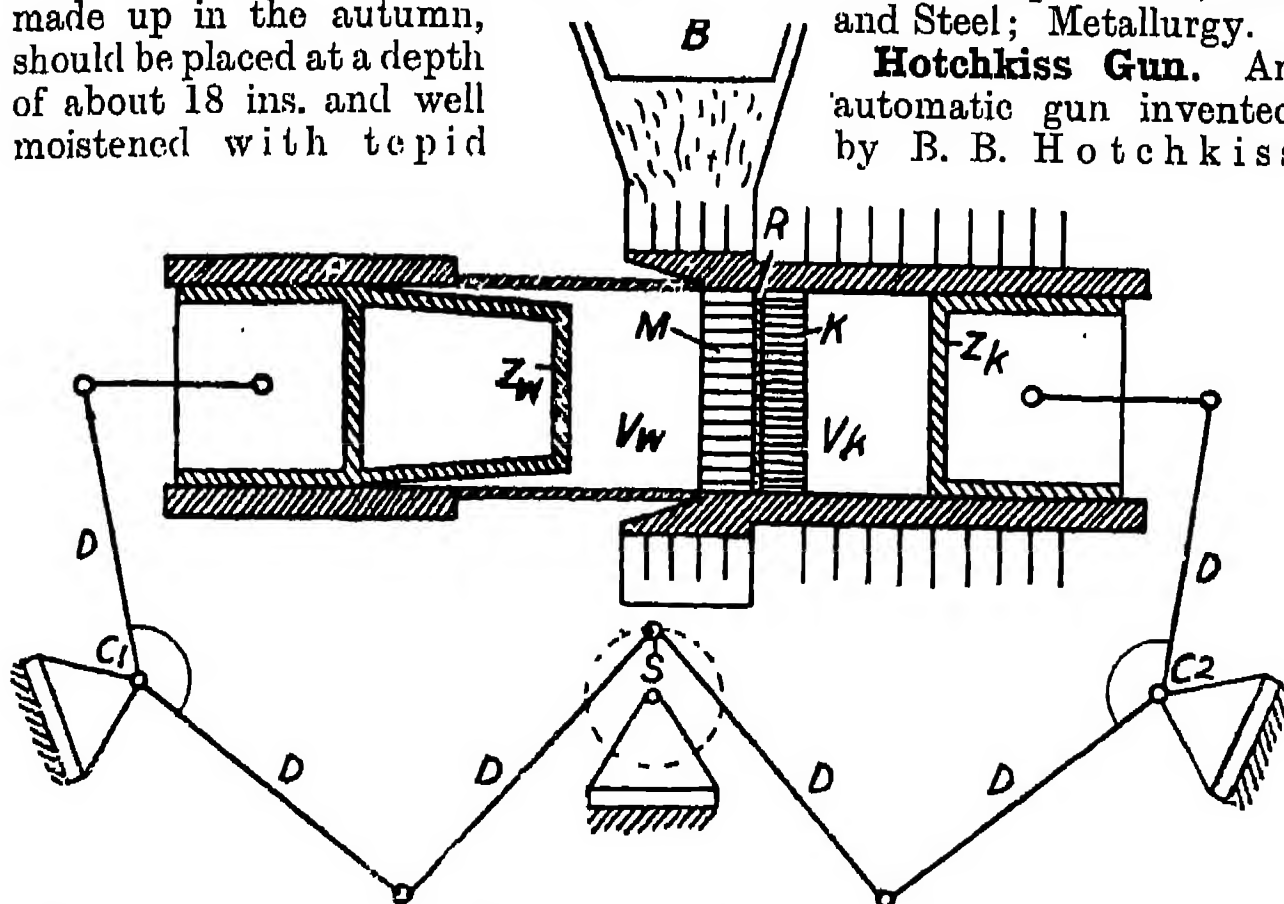


Hot Air Engine. Fig. 1: Ericsson Engine. A, beam delivering mechanical power and coupled to working piston B through crank C; D, displacing piston working in cylinder E

year, approximately three months in advance of the time at which the crops they bear are expected to mature. Stable manure, mixed with dead leaves, if the bed is made up in the autumn, should be placed at a depth of about 18 ins. and well moistened with tepid

400 lb. of furnace fuel. Today by far the greater portion of all pig-iron produced in the world is made by the aid of heated blast. See Blast Furnace; Cowper Stove; Iron and Steel; Metallurgy.

Hotchkiss Gun. An automatic gun invented by B. B. Hotchkiss



Hot Air Engine. Fig. 2: Philips Engine. B, burner; Vw, hot end; Zw, hot piston; Vk, cold end; Zk, cold piston; M, heater to heat air in hot end; K, cooler; R, regenerator delivering air to hot and cold ends; S, shaft rotated by lever motion DDDDDD riding on pivots at C1 and C2. See text in preceding page

Diagrams by courtesy of "Mechanics"

water. After being beaten down firmly, the bed should be covered by the frame, or other glass light available, for a week, to allow the foul steam to accumulate and pass away.

A layer of good, rich loam to the depth of 6 ins. to 1 ft., according to the nature of the crop to be raised, should then be spread upon the manure, and the hotbed is ready. Its average temperature should be maintained at 70° to 75° F., and when it falls below this point, the heat must be raised by the introduction of fresh manure. See Compost.

Hot Blast. Use of mechanical means for the purpose of supplying air more or less under pressure (forced draught or blast) to furnaces for the melting of metal. It appears early in the history of metallurgy, but the air was always used at atmospheric temperature until 1832, in which year a system of hot blast, devised by J. B. Neilson of Glasgow a few years earlier, was put into operation at the famous Gartsherrie ironworks in Lanarkshire. Neilson heated his air by extra fuel; but about the same time Faber du Faur, in France, was beginning to utilise the heat of the waste furnace gases from the furnace itself, for the same purpose. It was found that with Neilson's system 100 lb. of fuel expended in heating the air supplied to the furnace saved

(1826-85), American mechanic. The gun is gas-operated, the breech mechanism being actuated by a portion of the gases generated by explosion of the cartridges passing through a vent in the barrel before the projectile leaves the barrel. The gases force back a piston riding in a cylinder below the barrel, so sending the breech to the rear. The breech block, extractor, firing-pin, and other working parts are returned after the firing of each round by the expansion of a spring compressed by the rearward movement of the piston. The gun is cooled by air flow over the barrel. Rate of fire is 400 rounds per minute, and there are various types of Hotchkiss firing ammunition ranging from 1 lb. shell to .300 rifle ammunition. At one time the Hotchkiss was the standard automatic weapon in most armies, but in the British army it has been superseded by the Bren, Vickers, and Lewis guns. A heavy type of Hotchkiss is still used on small vessels of the Royal Navy. See Cannon; Machine-Gun.

Hotchpot (Fr. *hocher*, to shake, *pot*, pot). Term of English law. It means the bringing of property into a common fund or account so as to entitle the person bringing it in to share in the common fund which has been increased by his addition. It used to apply to lands given by a father to his daughter

on her marriage for herself and the heirs of the marriage. If the father died, leaving the same daughter and other daughters his co-heiresses, the married one could not take any of the inheritance unless she brought into hotchpot the land given to her by frank-marriage.

Under the Administration of Estates Act, 1925, when the property of a deceased person who has died intestate is divided among his children the same principles apply. Any property which the deceased in his lifetime had given to any child by way of advancement or marriage portion must be reckoned as part of that child's share for the purpose of the division.

Thus, a father has five children. In his lifetime he gives to his eldest daughter, A, £20,000 as a marriage portion. To a son, B, he gives £10,000 to buy a business. The father dies, leaving £50,000. A will not ask for anything out of the estate, because she would have to bring in her £20,000 and then share equally, and her share would be $(£50,000 + £20,000 + £10,000) \div 5 = £16,000$. B will come in, bringing his £10,000 into hotchpot. $£50,000 + £10,000 = £60,000$ will thus be divided equally between B and his other three brothers and sisters, yielding £15,000 each.

In wills and settlements the testator or settlor frequently directs that on a general division of the estate certain beneficiaries who have received previous benefits shall bring them into hotchpot. See Inheritance; Will.

Hotel. Modern term for a superior inn or tavern, a house where travellers and others are fed and lodged for payment. The word is a French one, and was at first used for a large house; this use persists to some extent. The palatial modern hotel dates from the introduction of railways, one of the first opened in England being the G.W.R. hotel at Paddington. A still more recent development is the residential hotel, where self-contained suites of rooms can be secured for prolonged periods, meals and service being provided by the hotel management. See Inn.

Hôtel de Ville. French name for a town hall, the German equivalent being Rathaus. Many of these buildings are remarkably fine structures, notably those in Orléans, Saumur, and St. Quentin. That in Paris is a splendid example of modern architecture. The one it replaced dated from the 16th century, and was burned

down during the rising of 1871. Excellent examples occur in Belgium, for example, at Brussels. See Town Hall.

Hôtel Dieu. The name given in France and elsewhere to a hospital, in the older sense of the word. The most noted is the one in Paris. It stands on the island in the Seine, and is said to have been founded in the 7th century. It was rebuilt in 1772, and again on another site in 1868-78. It is now a hospital of the regular type with a medical school attached. There are fine ones at Beaune and Tonnerre, and there is one at Montreal, a modern building but an old foundation. See Hospital.

Hothouse. Any glasshouse in which a minimum temperature of 65° F. is maintained by a coke-burning boiler and 4-in. hot water pipes to provide suitable conditions for the cultivation of tropical plants. Gardeners call a hothouse a stove and refer to the plants grown there as stove plants. Owing to the increased cost of fuel and other difficulties, hothouses are far less numerous than they were. Noteworthy collections of tropical plants in hothouses of large country estates have dwindled or disappeared, and it is now chiefly in botanical gardens that such plants are to be seen. Many species possess richly coloured leaves or brilliant flowers: among them are caladium, pitcher plant or nepenthes, gardenia, anthurium, and stephanotis as well as orchids. Tropical ferns are also grown there. Hothouses are used to force lilac, lily-of-the-valley, and other shrubs and plants into early bloom for the market. To counteract the heat of the glasshouse the atmosphere has to be kept moist by spraying with water.

Hot Springs. Natural outflow of water at a higher temperature than its surroundings. Most hot springs are found in the vicinity of volcanoes or in volcanic regions. They emerge sometimes at the side of glaciers or in the beds of rivers. Hot springs which periodically erupt violently are known as geysers. Many hot springs have waters possessing healing properties. See Geyser; Spa.

Hot Springs. City of Arkansas, U.S.A., the co. seat of Garland co. It is on the Ouachita river, in a valley between Hot Springs Mt. and West Mt., two wooded ridges of the Ouachita Range, and is surrounded by 340 m. of the shore of Lakes Catherine and Hamilton. Situated 54 m. W.S.W. of Little Rock, it is served by rlys. and an

airport. A health resort, it is visited by sufferers from gout and rheumatism for its thermal mineral waters, supplied by 47 springs in the W. slope of Hot Springs Mt. The area containing the springs is the oldest national park in the U.S.A. De Soto visited the springs in 1541, and they were a source of contention among the Indians. To prevent their exploitation for private gain, the government reserved some of the surrounding land in 1832, and in 1921 most of it became a national park. In 1882 the government erected an army and navy general hospital. At the summit of Hot Springs Mt. there is a steel tower commanding a wide view. Hot Springs was settled in 1804, incorporated in 1876, and became a city in 1879. Pop. (1950) 29,307.

Hot Springs. A village of Virginia, U.S.A., in Bath co. Situated amidst the Allegheny Mts. at an alt. of 2,300 ft., 206 m. S.W. of Washington, it is served by the Chesapeake and Ohio rly. Its thermal springs attract sufferers from rheumatism and gout. The first hotel on the site was built in 1765 and used as a hospital during the Civil War.

Hotspur. Name by which Sir Henry Percy, eldest son of the 1st earl of Northumberland, was known. He was killed in battle at Shrewsbury in 1403.

Hottentot (Dutch, quacker). Primitive people in S. Africa, calling themselves Khoi-Khoi. They are closely related to the Bushman in blood and language. They seem also to have been influenced by some Hamitic contact, probably in the days when they were of wider

geographical distribution, and more recently by Bantu intermixture. Under Bantu pressure their habitat became more restricted until at the European discovery they shared with the Bushmen the W. half of the Cape peninsula, whence they were driven by European penetration, into less favoured lands in the N.W. of the peninsula. There are 56,000 Cape Hottentots and upper Orange river Koranas, beside 14,000 Namaqua in the territory of S.W. Africa. They are characteristically nomadic pastoralists. In appearance they are of small to medium stature, they are brownish-yellow in colour, long-headed, with pointed chins and matted hair; steatopygia is a fairly common peculiarity among the women. Their dress, besides the fur kaross, includes wallets or loinbands for holding tool equipment. They use wood and calabash milk-bowls and clay cooking-pots, but have some knowledge of metals. Their portable bee-hive huts are arranged in small groups. Their social organization is politically decentralised. Their magic-religious customs, dominated by witch-doctors, include ceremonial dancing at the new moon. They reverence two ancestral heroes, Tsiuigoab and Heitsi-eibib; the mythology is of Bushman type.

The Hottentots have become much intermixed with other African peoples, and many ranked as Hottentot, except in Namaqualand, are half-breeds speaking a debased Afrikaans and employed as herdsmen or wagon-drivers. The Griqua, formerly in the Kimberley district, and formerly called Baastards, are of Boer-Hottentot descent.

The Hottentot language possesses over a dozen subdivisions, of which Nama is the most important. The main features are the presence of tones, the monosyllabic vocabulary, and the frequency of "click" sounds.

Hottentot Fig (*Mesembryanthemum edule*). A prostrate succulent shrub of the family Ficoideae, native of S. Africa. It has three-sided fleshy leaves, pointed at each end, and large yellow solitary flowers. The fruit, which is shaped like a small fig, contains a pleasantly acid mucilage which forms the basis of a preserve. See illus. next page.

Hottentot's Bread (*Tesudinaria elephantipes*). Climbing herb of the family Dioscoreaceae, native of S. Africa, more usually known as Elephant's-foot (*q.v.*).



Hottentot. Girl and man of this primitive South African people



Hottentot Fig. Foliage, flowers, and fruit of this South African shrub; see article in preceding page

Hottentots Holland. Dist. in Cape Province, S. Africa. As its name implies, it is one of the outposts of Dutch colonisation in S. Africa. The Hottentots Holland Mts. begin at the S. extremity of the Stellenbosch Mts., and run S.W. to the shores of False Bay. The rly. to Caledon goes through Sir Lowry's Pass, a gap in the range where the river Steenbraa-zens rises.

Hot Water Supply. There are two methods of providing hot water for domestic purposes

The storage system, the more popular, is equally suitable for large or small installations.

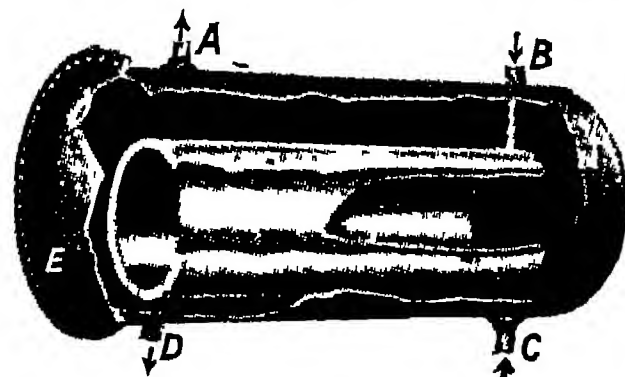
The general aim is to maintain sufficient hot water in storage, at about 150° F., to meet the probable maximum hourly demand. This varies for domestic purposes from 20 to 40 gallons for houses of 3 or 4 bedrooms. Sometimes 120° F. is preferred. In addition to reducing heat loss, and steaming at taps, this minimises furring and lessens the danger of scalding. But as a greater quantity of cooler water is necessary to meet a given duty, this lower storage temperature normally increases both draw-off and storage by 25 per cent.

The general lay-out of a direct domestic hot water supply installation, in which the water is heated by direct contact with the boiler-plate, is shown in Fig 1. The boiler may be an independent unit, as in the diagram, or a back boiler of an open fireplace or cooking-range. The storage cylinder may be of galvanised steel or copper; a rectangular steel tank will leave more shelf room in a cupboard.

Circulation through the primary circuit, between boiler and cylinder, is due to simple action of gravity. This movement arises from a difference in temperature and density

between the two columns, as explained under Heating (*q.v.*). Outflow occurs as indicated in the diagram by arrows when a hot tap is opened, the hot water being displaced from the top of the storage vessel by an inflow of cold water at the bottom from the cold feed pipe.

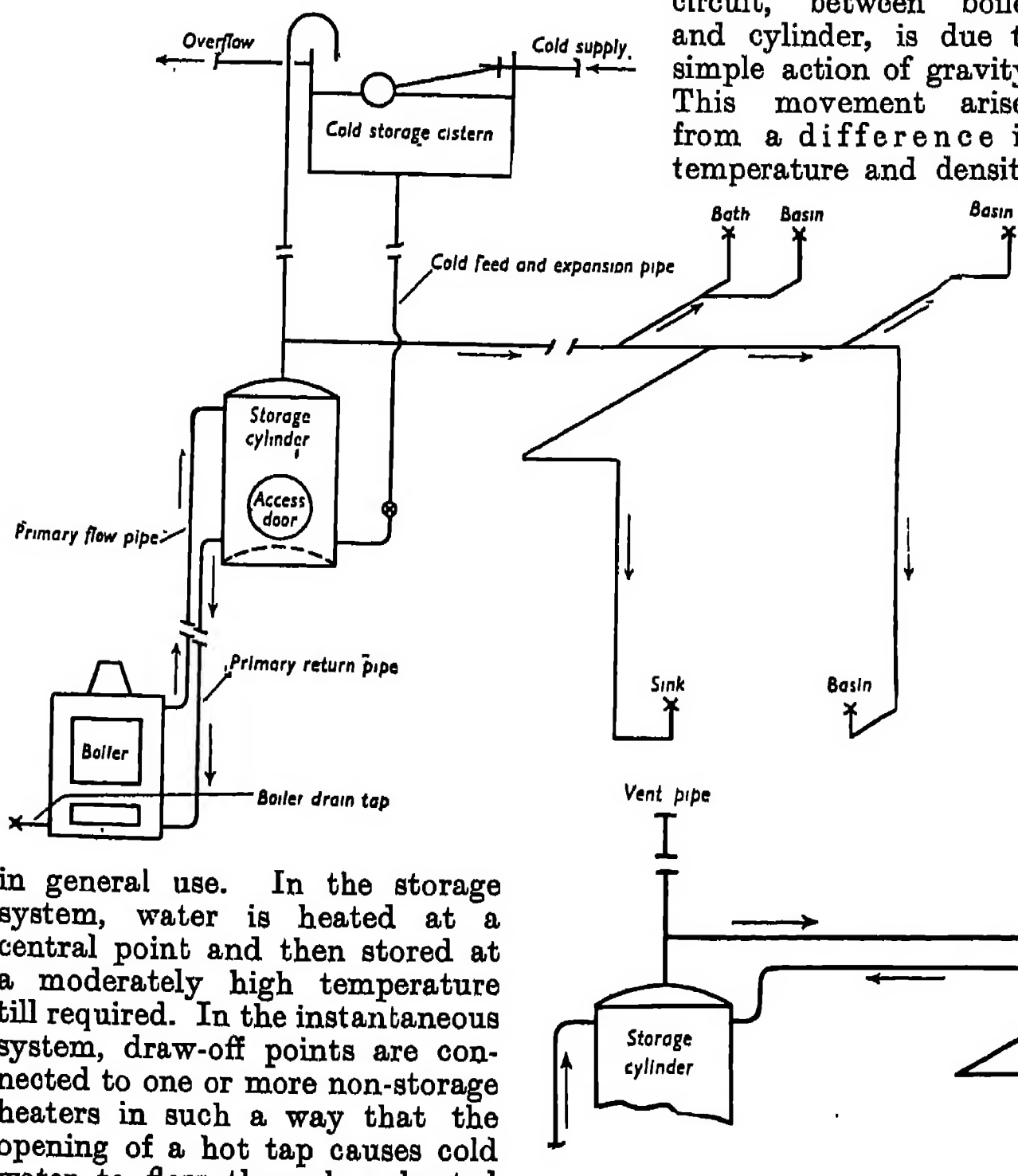
The "dead-leg" distribution shown in Fig. 1 requires that the cool or cold water lying in these pipes must be run to waste before hot water can reach a tap. Water supply by-laws often limit a dead-leg service to about 25 ft. When a longer pipe is required, it is necessary to provide a secondary



Hot Water Supply. Fig. 3. Indirect hot water horizontal cylinder, showing primary flow (B) and return (D); secondary flow (A) and return (E). C, cold water feed
Ideal Boilers & Radiators, Ltd

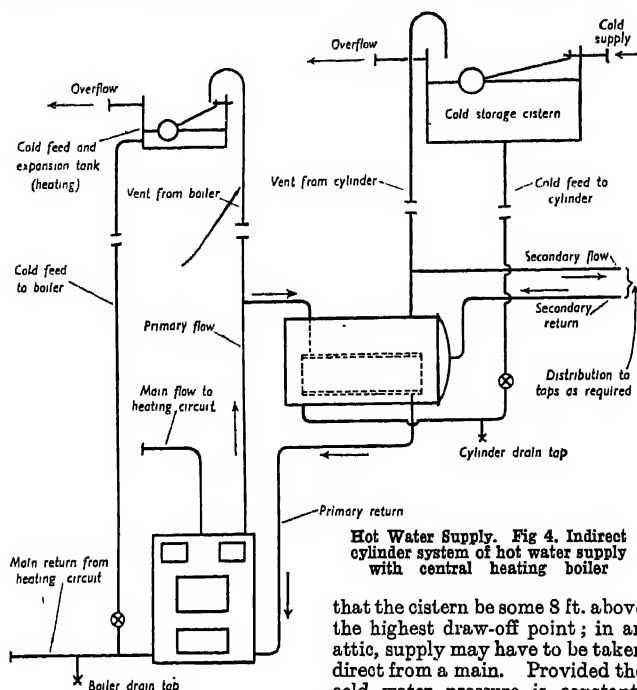
circulation by a loop of pipework as shown in Fig. 2. The circulation indicated by the arrows does not operate during outflow, when water moves along both pipes towards the open tap, but is continuous at other times.

When a domestic supply is heated by a central heating boiler, it is usual to employ an indirect cylinder as seen in Fig. 3, to avoid possible furring of the boiler and prevent rust from the radiators fouling the tap supply. These cylinders may be used horizontally or vertically. Fig. 4 shows the pipework arrangement of the hot-water supply section of such a system. The boiler water then circulates only through the primary circuit and the annular heater, and is not subject to change by draw-off. The water of



in general use. In the storage system, water is heated at a central point and then stored at a moderately high temperature till required. In the instantaneous system, draw-off points are connected to one or more non-storage heaters in such a way that the opening of a hot tap causes cold water to flow through a heated coil of pipework, and thus become heated before leaving the fitment.

Hot Water Supply. Fig. 1 (upper). Direct cylinder system of hot water supply. Fig. 2 (lower). Secondary circulation in distribution of hot water to taps



Hot Water Supply. Fig 4. Indirect cylinder system of hot water supply with central heating boiler

the hot service is stored within the outer cylinder, and is heated indirectly by contact with the inner. As before, the distribution may be dead-leg, or may require a secondary circuit.

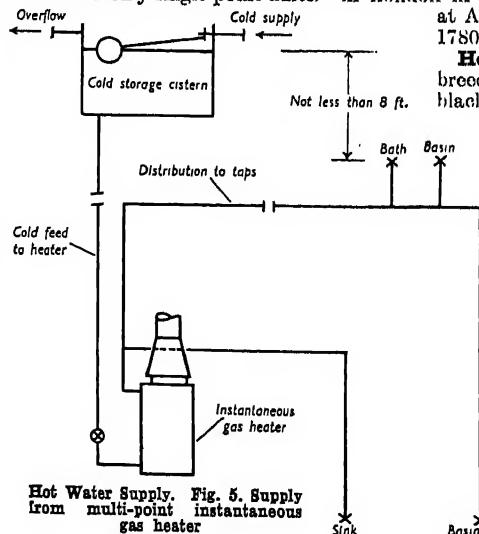
The only valid objections to the storage system are that loss of heat from water-backed tank and pipe surfaces may be excessive, and that continuous firing is necessary. In good practice, heat loss is largely eliminated by suitable lagging. Alternatively, the heat given off by a storage-tank may be usefully employed by housing the vessel in an airing cupboard.

An instantaneous water-heater, whether single- or multi-point, has the merit of heating water only for immediate use and in the exact quantity required. The general arrangement of a multi-point unit is shown in Fig. 5. The distribution is again dead-leg, without possibility of a secondary circulation. The gas supply, ignited by a continuously burning pilot jet, is controlled by the flow of water, and is cut off automatically by interlocking mechanism when the draw-off tap is closed.

The cold supply is best taken from a storage cistern to ensure a constant pressure. A limiting factor is that the water-pressure operated gas valve usually requires

that the cistern be some 8 ft. above the highest draw-off point; in an attic, supply may have to be taken direct from a main. Provided the cold water pressure is constant, the flow may be regulated: the slower the flow, the hotter the tap supply. At best, the discharge from a gas heater of this kind is necessarily less than from a good storage type installation.

Small electric water heaters are normally of the storage pattern, consisting of a heavily insulated cylinder supplied with cold water through a ball valve, and fitted with an immersion heater controlled by a thermostat; these are most commonly single-point units.



Hot Water Supply. Fig. 5. Supply from multi-point instantaneous gas heater

Larger immersion heaters installed in storage cylinders provide hot water at all points.

J. W. Cowan

Houblon, Sir JOHN (d. 1712). London merchant and banker. The son of a London merchant, a descendant of a Huguenot family, and probably a brother of Abraham Houblon, great-grandfather of Viscount Palmerston, he became a member of the Grocers' Company (*g.v.*). In 1689 he was sheriff and alderman and was knighted. He became lord mayor in 1695, and during 1694-99 was a



Sir John Houblon, London merchant After J. Cloosterman

lord of the admiralty. He was in 1694 one of the subscribers towards the establishment of the Bank of England (*g.v.*), and was appointed its first governor. It was at his instigation in 1696 that the bank advanced £200,000 to the king for the expenses of the army in Flanders. He died Jan. 10, 1712, and was buried in the church of S. Bonet, Paul's Wharf.

Houbraken, JACOBUS (1698-1780). Dutch engraver. Born at Dordrecht, Dec. 25, 1698, he was the son of Arnold Houbraken (1660-1719), a painter who spent several years in England and published biographies of the Dutch artists in 1718. Jacobus was a craftsman of high skill and engraved a large number of portraits, including many of distinguished Englishmen, which were published in London in 1743-52. He died at Amsterdam, Nov. 14, 1780.

Houdan. Domestic breed of fowls with black and white plumage, a peculiar branched comb, and long red wattles. They have short white legs like Dorkings, which they also resemble in having five toes. In France, prolific egg-production has made this a favourite breed with the peasantry; but in England it has been bred too much as a show-bird, with consequent increase of

feathers and reduction of eggs. The birds are hardy, easily reared and managed, and begin laying early. *See* Fowl; Poultry.

Houdenc, OR HOUDAN, RAOUL DE (12th cent.) A French troubadour. With Chrétien de Troyes he is referred to by the *trouvère* Huon de Méry in 1228 as a master of verse. Houdenc represents the starting-point of two great branches of French literature, the *roman d'aventure* and the allegorical poem. Apart from some shorter pieces, his works consist of the *Roman des Eles*, *Méragis de Portlesguez*, and possibly *The Vengeance of Raguidel*.

Houdin, ROBERT (1805–71). French conjurer. Son of a clock-maker, and born at Blois, Dec. 6, 1805, he changed his name from Jean Eugène Robert to Robert Houdin after marriage. He was destined for the law, but his aptness for mechanics induced him to apply himself at first to his father's business until, moving to Paris, he became known as a maker of mechanical toys and automata. On July 3, 1845, he opened a Theatre of Magic at the Palais Royal, afterwards transferring it to the Boulevard des Italiens. His application of the then little-known powers of electricity attracted attention almost all over the world.

In 1852 Houdin handed over his theatre to his brother-in-law, and in 1856 was sent by the French government to Algiers to impress the Arab chiefs with the idea of French superiority over the native marabouts or sorcerers. He gave performances in England in 1848–49 and in Germany in 1852. *See* Conjuring.

Houdini, HARRY (1873–1926). American entertainer. Born at Appleton, Wis., April 6, 1873, he became a locksmith, but went on to the variety stage as an expert in escaping from handcuffs, locked chambers, etc. A keen student of psychic manifestations, he so ingeniously reproduced, by secret methods of his own, the most astonishing forms of so-called phenomena that spiritualist writers hailed him as a medium endowed with powers of dematerialising and rematerialising at will, despite his own explicit assurance that no supernormal agency was associated with his acts. He died Oct. 31, 1926. *His Life Story*, by H. Kellock, appeared in 1928.

Houdon, JEAN ANTOINE (1740–1828). French sculptor. Born at Versailles, March 18, 1740, he

entered the *École Royale de Sculpture* at 12, won the *Prix de Rome* at 20, and spent the next ten years in Italy. Returning to France, he won renown as a portrait sculptor and a teacher. His busts included those of Catherine II, Diderot, Turgot, Gluck, and Buffon; his head of Mirabeau is a striking portrait. His bust of Rousseau, now in the Louvre, was made from the death-mask; the *Théâtre Français* has his bust of Molière and his statue of Voltaire. In 1785 he journeyed to America and made a statue of Washington, a copy of which is outside the National Gallery in London. The only example of his original work in England is the bust of Sophie Arnould as Iphigenia in the Wallace Collection, London. He made busts of Ney and of Napoleon, who rewarded him with the Legion of Honour. Houdon died in Paris, July 16, 1828.

Houghton, RICHARD MONCKTON MILNES, 1ST BARON (1809–85). British poet and politician. Born in London, June 19, 1809, he was educated at Trinity College, Cambridge, where he became a member of the coterie known as the Apostles, and a friend of Tennyson, Hallam, and Thackeray. He travelled in Germany, Italy, and Greece, 1832–36, and represented Pontefract in the house of commons, 1837–63. He was created Baron Houghton of Great Houghton in 1863, visited Canada and the U.S.A. in 1875, was made F.R.S., and died at Vichy, Aug. 11, 1885.

His works include *Memorials of a Tour in Greece*, chiefly Poetical, 1834; *Memorials of a Residence on the Continent and Historical Poems*, and *Poems of Many Years*, 1838; *Palm Leaves*, 1844; *Life Letters*, and *Literary Remains of John Keats*, 1848; *Monographs, Personal and Social*, 1873; *Collected Poetical Works*, 1876.

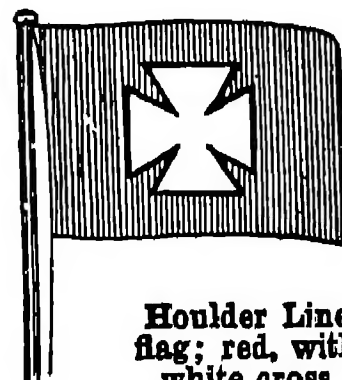
One of the central figures in the social and literary life of his time, the *Vavasour* of Beaconsfield's novel, *Tancred*, he was a man of the widest sympathies, the benefactor of David Gray and many another struggling man of letters; one of those who secured the laureateship for Tennyson, and one of the first to recognize the genius of Swinburne. His verse,

notable for its grace and meditative charm, especially in such lines as those of *Strangers Yet* and *Lady Moon*, has a lasting fragrance. He saw good in most things, a quality his friend Carlyle hit off in the phrase: "There is only one post fit for you, and that is the office of perpetual president of the Heaven and Hell Amalgamation Society." (*Consult* Monckton Milnes, J. Pope-Hennessy, 2 vols, 1950, 1952.) His son and successor became the 1st marquess of Crewe (*q.v.*). *Pron.* howton.

Houghton, (WILLIAM) STANLEY (1881–1913). British dramatist. Born in Manchester, he was educated at its grammar school and, developing an interest in the drama, wrote dramatic criticism for *The Manchester Guardian*, and became associated with Miss Horniman in the repertory theatre movement. His own fame as a dramatist rests chiefly on *Hindle Wakes*, 1912, a powerful picture of life in a Lancashire cotton town. First staged in Manchester by Miss Horniman's company, this was later seen in London and was several times revived. It was successfully adapted first as a silent film and later as a talking film. None of Houghton's other plays attained the same success, though *The Younger Generation* remained popular with repertory and amateur companies. He died Dec. 10, 1913.

Houghton-le-Spring. Urban dist. and market town of Durham, England, 6 m. N.E. of Durham. Bernard Gilpin, "the apostle of the north," was rector of the parish, 1556–83. Coalmining is the principal industry. The council owns the water supply in part of the district, also a cemetery, and sewage disposal works. There are two railway stations in the district. Houghton-le-Spring gives its name to a co. constituency including Seaham and the rural district of Sunderland. Market day, Sat. Pop. (1951) 30,676.

Houlder Line. British steam- and motor-ship owners. The company was founded in 1864 by Edwin Houlder, a shipbroker and forwarding agent. In partnership with his two brothers, he chartered,



Houlder Line flag; red, with white cross

built, and operated sailing ships for the S. African, Indian, and Australian trade. One of their iron-built clippers, the *Brilliant*, set up a

record on the London-Sydney passage. They eventually transferred their activities to the S. American trade, acquired steamships, and in 1899 formed the Houlder Line, later to absorb the Empire Transport company, the British Steam Navigation company, and the Alexander shipping company. It maintains regular services between London, Liverpool, and Bristol and S. America; London and S. Africa; Antwerp and the River Plate. Its head offices are at 53, Leadenhall St., London, E.C.3.

Hound. Term for a hunting dog, whether it hunts by scent (e.g. the foxhound) or by sight (e.g. the greyhound). Hound breeds are of all types and sizes, from Irish wolfhounds, greyhounds, and bloodhounds to the much smaller beagles and whippets, and include the eastern coursing breeds Afghans and Salukis.

Among the numerically smaller hound breeds are harriers, an old English breed used to hunt hares, much resembling the foxhound but rather smaller; otterhounds, rough coated, with very thick water-resisting undercoat, standing 25-26 ins. at the shoulder, and in some respects resembling the bloodhound, grizzle, fawn, blue and white, or black and tan in colour; and the Finnish Spitz, with prick ears and tightly curled tail, reddish brown in colour, height, dogs 16½-19 ins., bitches 14½-17½ ins.

Hound of Heaven, THE. Allegorical poem by Francis Thompson. Its theme is that the individual cannot escape from the power and love of God (the hound). Imaginative sweep and abundance of quotable phrases have given it a sure place in devotional literature.

Houndsditch. A London city thoroughfare. It runs N.W. from Aldgate High St. to Bishopsgate, parallel with Duke St., Bevis Marks, and Camomile St. The church of S. Botolph is at its E. corner. It figures prominently in

Defoe's *Journal of the Plague Year*. When filled in, paved, and built over in the 16th century it became a sort of Jewry. According to tradition the body of Edric, the murderer of Edmund Ironside, was thrown into the ditch here after he had been beheaded by order of Canute. Much bombed in the Second Great War, Houndsditch contains shops of wholesale merchants and clothiers.

Hound's-tongue (*Cynoglossum officinale*). Biennial herb; family, Boraginaceae. A native of Europe, N. Africa, N. and W. Asia, it has a fleshy, tapering root, and the whole plant is abundantly clothed with soft hairs. The leaves are oblong-lance-shaped; the funnel-shaped flowers are dull red-purple, in short sprays from the axils of the upper leaves. The fruits are four flattened oval nutlets, covered with spines which ensure their distribution by clinging to the fur of animals. See Boraginaceae.

Hounslow. District of Middlesex, England. Within the borough of Heston and Isleworth, it is 12½ m. W.S.W. of London, and has omnibus and Underground railway connexion with all parts of Greater London. The Great West Road passes for about 3 m. along the N. side of the district. In the coaching age Hounslow was the first posting station on the Great West Road. It is the principal military depot for the county and the headquarters of Eastern Command. Near here are the Royal Military School of Music, formerly Kneller Hall (q.v.); Osterley Park (q.v.); Syon House, seat of the duke of Northumberland, first opened to the public in 1950; and Cranford church, where Fuller, author of *The Worthies of England*, is buried. The old priory chapel of the Brethren of the Holy Trinity was pulled down in 1828, when the church of Holy Trinity was built, the chancel being added in 1856; fire in 1943 left it a shell.

Hounslow Heath, which once extended W. from the town for over 5 m., and the greater part of which is enclosed, has been the scene of notable military and other assemblages, and was in the 18th century infested with highwaymen. On it in 1784 was marked the base line, 27,404 ft., of the first trigonometrical survey

made in England. The first airport for London was opened at Hounslow, 1919. Near by is Heathrow, where London airport was established after the Second Great War. Pop. (1951) 47,819. See London Airport.

Hour. Twenty-fourth part of a day, divided into 60 mins., each of 60 secs. The length of the hour depends on that of the corresponding day: a sidereal hour is 59 mins. 50.17 secs. of mean solar time, and a mean solar hour is 1 hr. 9.86 secs. of sidereal time (see Day). The civil hour is one twenty-fourth of the mean solar day.

Ancient Greeks and Egyptians divided each day and each night into 12 equal parts called temporal hours. These differed in length seasonally as the duration of daylight varied. At the equinoxes day and night are of equal length, so that the temporal hours became equal to one another then. This equinoctial hour is the modern hour, and was first used for all seasons by Hipparchus (c. 120 B.C.). It quickly became established in astronomical tables, but the use of temporal hours for the ordinary purposes of life persisted until the 14th century, when mechanical clocks were invented. Since it was impracticable to make clocks strike the unequal temporal hours, they struck equinoctial hours, described as "of the clock" to distinguish them from temporal hours. The phrase survives as "o'clock."

In the Hellenistic period the temporal hours were numbered in two twelve-hour periods starting from sunrise and from sunset. The 24 equal hours of Hipparchus were referred to a zero hour at midnight. Ptolemy in his astronomical tables used 24 equal hours but reckoned from a zero hour at noon. This latter system survived until 1925, since when by international agreement the principal almanacs have used a 24-hour reckoning from midnight. This is the civil day, but for convenience an unofficial division into two 12-hour periods *ante* and *post meridiem* is retained. Attempts to introduce the 24-hour clock into civil use in Great Britain have hitherto failed, except where (as in trans-Continental rail and air travel) confusion might arise between the a.m. and p.m. hours.

Hour Angle. Angle at the celestial pole between the meridian and the hour circle of a star, measured W. from the meridian. Since it indicates the time elapsed since the meridian passage of the star, it is usually measured in



Hounslow, Middlesex. The High Street in this district of Greater London which flanks the Great West Road

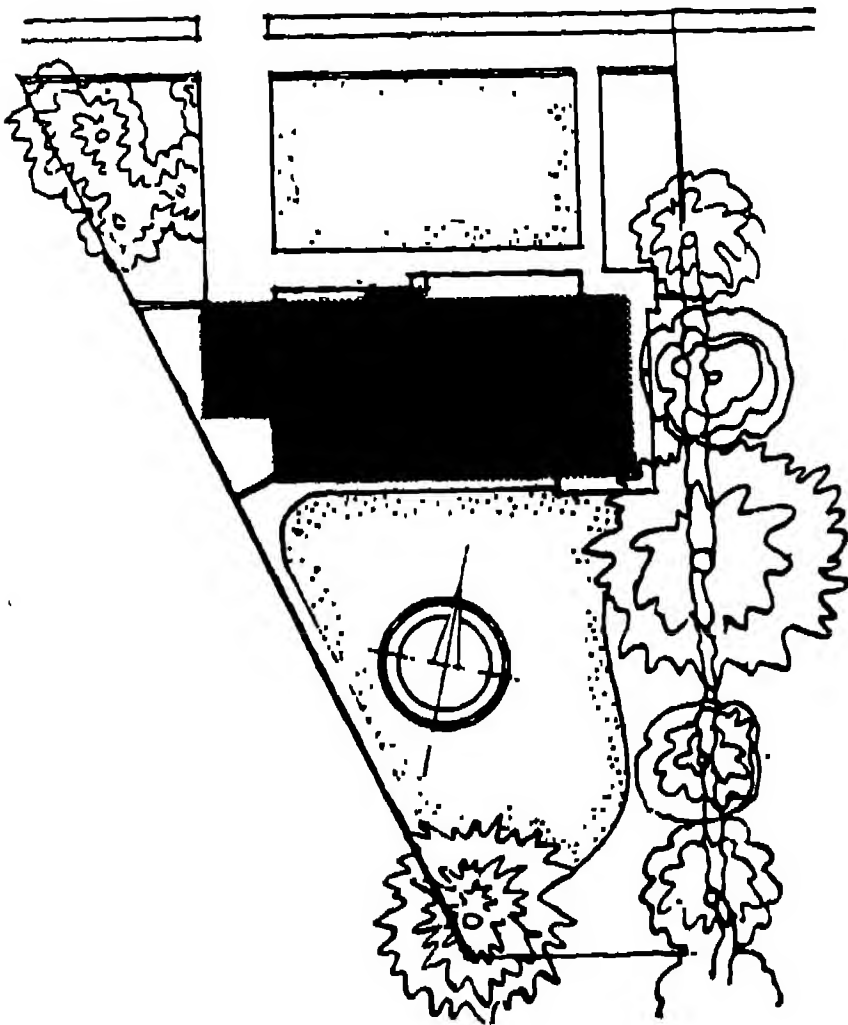
HOUSE: AN ARCHITECT-DESIGNED BUNGALOW, 1946

Architect: H. W. W. Fenwick, student, R.I.B.A.

Builders: John Hopkins, Ltd.

This bungalow was built at the cost of £1,080, and was designed to suit a high ground position in Buckinghamshire. It is traditional in construction, having 11 in. cavity walls; facing bricks are local wire-cut and the front elevation wall is finished in "Snowcem" rough rendered. The living-room and bedroom floors are of Swedish redwood blocks.

The living-room is heated by a slow-combustion stove



Layout of bungalow and garden. The latter has an equal area of ground to both front and rear elevations. A tree-lined border on the E. side affords protection against cold winds; the W. side, being open, acts as a sun trap to the rear elevation

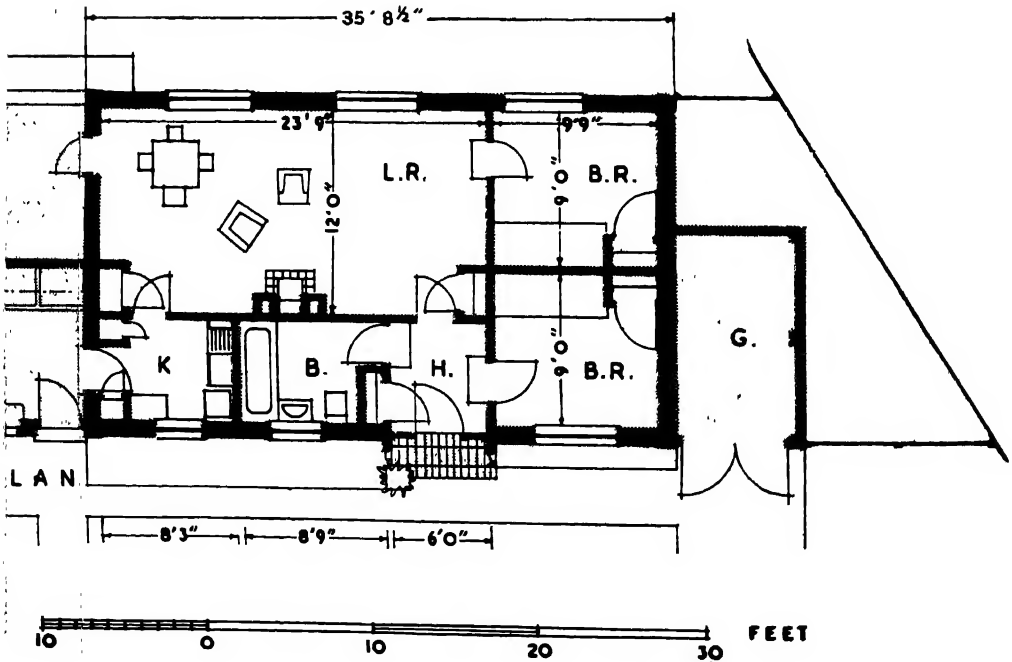
This view of the back of the bungalow (with a south aspect) shows three large steel casements and a side door which opens from the living-room on a small loggia to the right





Front view of the bungalow, showing kitchen, bathroom, and bedroom windows. Openwork brick supports the front porch and the kitchen entrance, and a low brick wall borders the garden

Photos, The Architect and Building News

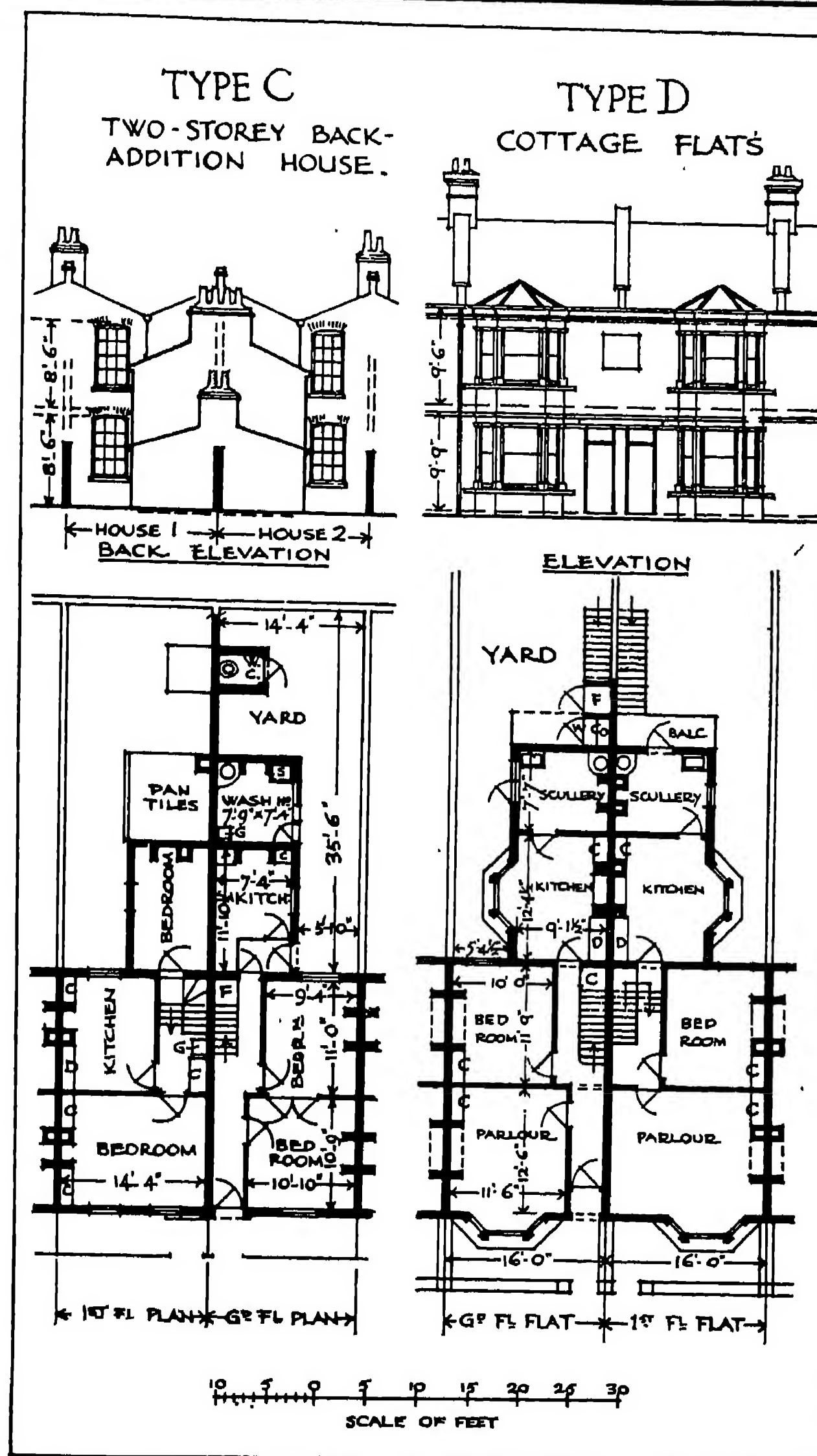


side with dwellings of brick, rough-cast, and sham half-timbering which bore no relation whatever to local tradition. After the First Great War it was local authority housing that produced the best examples of the cottage.

Between the First and Second Great Wars the main influence on the design of houses of all sizes was Georgian, the last of the great styles in England. It satisfied most current requirements, but there was no really consistent thought. At the same time there was a development away from this tradition brought about partly by a change in the method of living, for which large spaces were preferred to individual rooms, and such spaces could be secured by the use of a framed structure having columns and beams of steel or reinforced concrete (instead of the oak of medieval times) with large window openings or panels within the frame. This method of building had developed logically on the Continent from the work of men like Morris, Voysey, and Macintosh, but it proved less successful in England, where some examples of this work, which relies on texture and colour of surface for its principal effect, looked shabby after a few years.

Prefabrication Experiments

During the Second Great War house building virtually ceased in Europe; but in Great Britain much thought was given to preparation for post-war building. A very great number of houses, mostly to rent, were required at once; and the fact that traditional construction involved a long process of erection on the site, followed (since most materials are used wet) by a period of drying out, led to experiment with types of buildings which could be rapidly constructed on the site by fitting together factory-made components. Several novel methods of building were evolved and approved by the authorities; and these "prefabricated" houses, like the houses of traditional type, could be divided into buildings with load-bearing walls and buildings having a framed structure. They had no advantage in cost over traditional construction, though most of them were intended to be temporary. Their fittings for cooking, washing, and other domestic activities were much above the standard to be found in permanent houses of earlier date and comparable size. The application of prefabrication to permanent construction, except



House and Housing. Plans of typical small houses built before 1914
 Drawings from *London Survey of Life and Labour*, Sir H. Llewellyn Smith (Staples Press)

details such as doors, window frames, and fixtures, remained still in the experimental stage.

HOUSING. The industrial expansion of the early 19th century in the U.K. required a greater concentration of workers than had been known previously, and necessitated the provision of massed houses. Wages were low, and to allow rents to correspond houses were built cheaply. There was no transport, so that people wanted to live as close to their work as possible. There were no building laws governing the con-

struction of streets and houses. The result was that the largest number of persons was crowded into the smallest possible area. Towns grew haphazardly with little consideration for the real needs of the time and none for the future. Houses were mere brick boxes, one room up and one down, without drainage or water supply, and often built back to back, in narrow courts where proper ventilation was impossible.

Reporting to the poor law commissioners in 1838, Dr. Southwood Smith referred to "quarters

inhabited by hundreds of thousands of the labouring classes . . . crowding more or less dense in courts and alleys and narrow streets almost insusceptible of ventilation, in dwellings which themselves were not fit to be inhabited by human beings—while all around the dwellings the utter absence of drainage, the utter omission of scavenging and nuisance prevention, the utter insufficiency of water supply, conducing to such accumulations of animal and vegetable refuse, and to such pondings of odorous liquids, as made one universal atmosphere of filth and stink."

This description might have applied to parts of any sizable town in the middle of the 19th century. Some such groups of buildings remain, and are still inhabited.

The earliest public health legislation was the Public Health Act, 1848, which resulted from public alarm at the heavy incidence of disease in large towns throughout the country. It followed the publication of the reports of the health of towns committee, 1840, and the committee on the sanitary condition of the labouring population, 1842. It had been preceded by the Towns Improvements Clauses Act, 1847, which, however, imposed no control on the building of new houses. During 1865–

1914 many acts, resulting in real improvements, were introduced. The Public Health Act, 1875, some of the clauses of which are still in force, repealed the Act of 1848, and empowered local authorities to make by-laws for the control of the building of individual houses. These building by-laws insisted on good construction of the houses themselves, and the provision of sufficient space around the houses to ensure light and air. Under this legislation, administered 1919–51 by the ministry of Health, housing of a reasonable standard was provided, before the First Great War, mainly by private enterprise, much by charitable trusts such as the Peabody trust and similar non-profit making bodies, and some by local authorities.

Between 1920 and 1939, the government adopted as the standard for working class housing the recommendations of the Tudor Walters report, 1918, that houses should be built not more than 12 to the acre, each with its own garden, in a well planned estate. The house usually built, often referred to as the "inter-war standard house," had a floor area of 750 sq. ft., and is commonly found in blocks of two, four, and six. A typical house contains a living room, a kitchen, three bedrooms, a bathroom, a W.C.

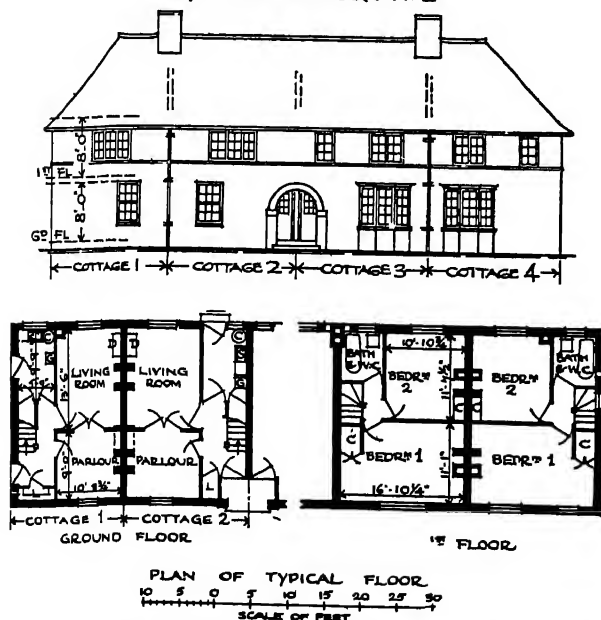
under cover, a ventilated larder, and space for coal, pram, etc.

A better standard of housing meant increased building costs, and therefore higher rents, made all the higher by the rise in building materials and labour from 1920. Building of houses by private enterprise, except for sale, was no longer profitable. To meet this situation the government made local authorities responsible for meeting housing needs in their districts; while the Housing, Town Planning, etc. Act, 1919, restricted to schemes approved before July, 1921, provided that any annual loss in excess of a rate of a penny in the pound should be borne by the state, thus establishing the principle of state subsidisation of housing. Further Housing Acts, 1923 and 1924, provided for a state contribution of a fixed annual sum per house, the remainder of the loss to be borne by the rates.

These grants were modified and subsequently abolished by Acts of 1926, 1928, and 1933. The 1923 Act also provided that the loss on slum clearance and rehousing schemes should be shared between the state and the ratepayer; and an act of 1930 made further and better provision for the clearance and improvement of unhealthy areas, and for dealing with areas (improvement areas) not so bad as to justify total clearance. An Act of 1925 consolidated the permanent law relating to the housing of the working classes in England and Wales, and a further Act of 1935 was concerned with the abatement and prevention of overcrowding. The permanent law relating to the housing of the working classes was further consolidated by the Housing Act of 1936, one of the provisions of which required the minister of Health to set up a central housing advisory committee to consider the operation of, and to advise on matters arising from, the various Housing Acts.

Although the legislation designed to aid the provision of housing by local authorities proved effective, of the total of 4,334,328 houses built between 1920 and 1939, 1,332,189 were built by local authorities with state assistance, 3,002,139 by private enterprise, often by the speculative builder, and including 470,920 built with state assistance. Of working class houses (defined in 1931 as a house with a rateable value of not more than £13 in the provinces), 950,000 were built up

4 ROOM PARLOUR TYPE



House and Housing. Elevation and plan of local authority houses in the period between the two Great Wars

to 1937 by local authorities and 550,000 by private enterprise. (These figures are taken from *Rebuilding Britain: A Twenty-Year Plan* by Sir E. (later Lord) Simon, 1945.)

A sub-committee of the central housing advisory committee was appointed in 1942 "to make recommendations as to the design, planning, lay-out, standards of construction, and equipment of dwellings for the people throughout the country." Their report (*The Design of Dwellings*, usually referred to as the Dudley report) contained recommendations which were widely adopted, both for local authority housing, and also in private enterprise work, although consideration was confined to the types of dwellings commonly built by local authorities, under powers conferred under the Housing Act, 1936.

Dudley Report Recommendations

The report reflected the changes of outlook and habit which had occurred during the 25 years following the publication of the Tudor Walters report. That report assumed that local authorities would build not more than 200,000 houses, although in fact they built more than six times that number. The Dudley committee had in mind the programme of the 1940-45 Coalition government, which envisaged the building of between three and four million houses in 10-12 years, and the creation of independent new towns instead of the extension of existing communities by small estates of municipal houses such as had been thought enough to satisfy the nation's needs in 1918. The Dudley report called attention to the need of dwellings not only for the family of average size, for which the normal 3-bedroom house is suitable, but also for larger families, for old people, and for single people; and to the need for minimum standards of construction somewhat different from the requirements of the by-laws, which are concerned principally with stability. These standards were summarised under the following headings: strength and stability, freedom from damp, thermal insulation, sound insulation, resistance to fire, durability and ease of maintenance, resistance to vermin infestation.

A floor area of 950 sq. ft. for individual dwellings (compared with the 750 sq. ft. of 1918) was proposed; and investigation of the way in which families live resulted in suggestions for different



House and Housing. Part of the Roehampton Estate, London, a typical estate of inter-war local authority housing, as foreshadowed in the Tudor Walters report, 1918.

Ministry of Health. Crown copyright reserved

ways of planning the ground floor as follows:

- | | |
|--|-------------|
| 1. Living Room | 160 sq. ft. |
| Kitchen, with space for meals (Dining-Kitchen) | 110 sq. ft. |
| Utility Room (for laundry, etc.) | 35 sq. ft. |
| 2. Living Room, with recess for meals | 210 sq. ft. |
| Kitchen for cooking and laundry | 100 sq. ft. |
| 3. Kitchen-Living Room | 160 sq. ft. |
| Scullery | 50 sq. ft. |
| Sitting Room | 110 sq. ft. |
| Utility Room in out-building | 35 sq. ft. |

The last is for country districts where cooking must be done on a coal range. Rooms on the first floor are 150 sq. ft., 110 sq. ft., and 70 sq. ft., with a bathroom and separate W.C.

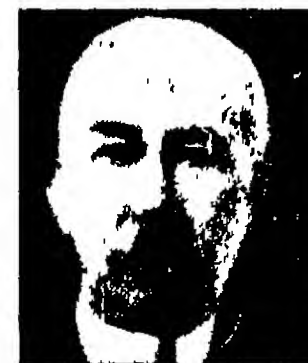
An Act of 1951 made the ministry of Local Government and Planning (later Housing and Local Government) responsible for housing.

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House, or **HOUSEY-HOUSEY**. Game of chance popular in the British navy, army, and air force, and the only form of gambling officially permitted in barracks canteens. Basically the game is identical with lotto (*q.v.*), except that occasional variations are made in the methods of covering the numbers to achieve "house."

Thus, at the discretion of the banker, the top, second, or third line only need be completed (single-line house). Alternatively, the top and third lines must be covered, making a sandwich. When calling out his numbers the banker has a recognised patter and various nicknames, *e.g.*, I is Kelly's eye; 9, medicine and duty; 11, legs eleven; 21, key of the door; 50, Old West Kents, or blind half hundred; 66, clickety click; 90, top of the house.

House, EDWARD MANDELL (1858-1938). American politician. Born at Houston, Texas, July 26,



Edward Mandell House, American politician

1858, he was educated at New Haven and Cornell university. He exercised influence in the political affairs of Texas, but his wider career was due to his friendship with President Wil-

son. In 1914 the president sent House to Europe to gather information about the belligerent countries. With the entrance of the U.S.A. into the First Great War, House was prominent as American representative at various conferences, and then at the peace conference in Paris. He and Wilson never met after 1919. House, who used the title of, colonel though never a soldier, died March 28, 1938. Consult his *Intimate Papers*, ed. C. Seymour, 1926-28.

Houseboat. Barge with superstructure fitted up as a temporary dwelling; or a permanently moored boat with deck-cabin suitable for residence. In Great Britain house-



Houseboat. Summer and holiday river dwellings of different types, moored on the river Leven

boats are used chiefly on the Thames, the Norfolk Broads, and estuaries of rivers, as summer or holiday houses.

Housebreaking. By the Larceny Act, 1916, the following are made felonies: breaking into and entering a dwelling-house or shop, warehouse, office, etc., and committing a felony (*e.g.* theft) therein, or committing a felony in the building and breaking out of it (maximum punishment 14 years' imprisonment); breaking into and entering any of the above buildings, with intent to commit a felony therein (maximum punishment seven years' imprisonment); entering a dwelling-house in the "night" (*i.e.* between 9 p.m. and 6 a.m.) with intent to commit a felony (maximum punishment seven years' imprisonment).

The main distinction between burglary and housebreaking is that burglary can be committed only at "night" and in a dwelling-house, whereas housebreaking can (as in the two cases first mentioned) be committed in the day time and in a building other than a dwelling-house.

House Flag. Private flag of the owner flown by a seagoing vessel. Every steamship company has its own flag, which is flown in addition to the national flag, the latter being invariably hoisted at the stern. The flags of the principal British and foreign lines are illustrated under their respective companies.

House-fly (*Musca domestica*). Two-winged insect of the order Diptera. Grey in colour with four narrow black stripes down the back of the thorax, it is about $\frac{1}{2}$ in. long. It sucks up its food through a trunk or proboscis ending in a pair of fleshy lobes; this organ is retracted beneath the head when not in use. Many flies that frequent houses belong to other species, including the biting house-fly (*Stomoxys calcitrans*).

The eggs are chiefly laid in heaps of fermenting horse-manure, decaying organic matter, household refuse, etc. Under favourable conditions the eggs hatch in 8-24 hours. The larvae or maggots are $\frac{1}{2}$ in. long when mature and may turn into pupae within a week. Three or more

days are spent as pupae. The flies are most numerous in Great Britain during Aug.-Sept. It is uncertain how they pass the winter—possibly as pupae or larvae.

The house-fly spreads the germs of "summer diarrhoea" among infants; also cholera, typhoid, etc., and maladies caused by parasitic worms. It may act as a mechanical carrier, the germs being attached to the outside of its body; or they may be voided in its excrement on human foods. The destruction of breeding materials and trapping of the flies are the chief measures for keeping them under control.

Household. Collective term for those who reside in a house, including any employed in domestic service. In a special sense it is used for the retinue of a sovereign, and the British royal household has a particular importance historically. See Royal Household.

Household Cavalry. British combined cavalry unit consisting of Life Guards (*q.v.*) and the Horse Guards (*q.v.*). During the Second Great War both regiments were mechanised and on active service as armoured car units. In



House-fly. This common insect, here greatly magnified, carries disease germs on body and legs, thereby infecting food

peace time, however, they are horsed, and act as mounted escort to the sovereign on state occasions.

Household Gods. Name given by the ancient Romans to certain inferior deities who looked after the home and family, especially to the Lares and Penates. See Lares.

Household Troops. Regiments which have a special association with the sovereign. In France such were the *maison du roi*. In England the kings since Charles II have had regular regiments of guards which, although part of the regular army, perform special services on ceremonial occasions, and serve as guards to the royal residences. The British household troops consist of the Grenadier, Coldstream, Scots, Irish, and Welsh Guards (infantry), and the Life and Horse Guards (cavalry). Each regiment is described under its own title.

Household Words. A two-penny weekly miscellany founded, edited, and partly owned by Charles Dickens, and published by Bradbury and Evans. The issues are dated from March 30, 1850, to May 28, 1859, by which time Dickens had broken with his publishers following their refusal to print in Punch a statement about his separation from his wife. He then transferred his interest in the journal and the goodwill of his name to the new but similar journal, All the Year Round, published by Chapman and Hall. A Child's History of England and Hard Times, as well as Mrs. Gaskell's Cranford and North and South, originally appeared as serial stories in Household Words. The journal was famous for its Christmas numbers. See All the Year Round.

Houseleek (*Sempervivum tectorum*). Perennial succulent herb of the family Crassulaceae, native of Europe and W. Asia. The flat fleshy leaves form a dense rosette, and have a purple edge, the flat tip a sharp spine. The leafy, flowering shoots rise straight to a height of 1 ft. or 2 ft., ending in a spreading cluster of dull, red-purple flowers.

Housemaid's Knee. Inflammation of the bursa, which lies over the lower half of the patella or knee-cap. A bursa is a small sac containing fluid which serves to diminish friction between the bone and the tendon of the muscles attached to the bone. As a result



Houseleek. The plant as it appears in July

of frequent kneeling on a hard surface, it becomes swollen and enlarged. A similar condition may follow injury or be associated with chronic gout or rheumatism. Treatment consists in resting the limb, immobilising it by strapping, and applying heat. Removal of the fluid by tapping may be necessary.

House of Commons. Lower legislative chamber of the British parliament. See Commons, House of; Parliament.

House of Keys. Lower house of the legislature of the Isle of Man. See Keys, House of.

House of Laity. One of three houses of the national assembly of the Church of England, the others being the house of bishops and the house of clergy. It consists of some 350 members elected for the provinces of Canterbury and York, and a few co-opted members. The exact number is fixed from time to time by the church assembly. Members are elected every five years by the lay members of the diocesan conferences, but always proportionately to the number of persons on the parochial rolls of each diocese. The house of laity may have up to ten coopted members. It possesses its own standing and legislative committees. It may, on occasions, sit and vote separately.

House of Lords. Upper legislative chamber of the British parliament. See Lords, House of.

House of Representatives. Lower house of the legislature of the U.S.A. See Congress.

Housing and Local Government, MINISTRY OF. Name given in 1951 to the ministry of Local Government and Planning which had been formed early in the year from the ministry of Town and Country Planning and those departments of the ministry of Health concerned until then with housing and local government. Its address is Whitehall, London. S.W.1.

Housman, ALFRED EDWARD (1859-1936). British poet. Born March 26, 1859, and educated at Bromsgrove School and S. John's College, Oxford, he was for ten years a higher division clerk in the patent office before being appointed professor of Latin at University College, London, 1892. In 1911 he was made fellow of Trinity, Cambridge, and professor of Latin at that University. His fame as a poet rests on three small volumes of lyrics: *A Shropshire Lad*, 1896; *Last Poems*, 1922; and the posthumously published *More Poems*, 1936. Simple but

highly finished in style, they reveal a bitterness against the world and sometimes a morbid preoccupation with violent death. At their best—e.g. In summertime on Bredon; Loveliest of trees—they are sublime; at their worst they incline to bathos. As a classical scholar Housman edited Juvenal, Manilius, and Lucan. He died April 30, 1936. Consult *Life*. G. L. Watson, 1957.

Housman, LAURENCE (b. 1865). British poet and dramatist. Born July 18, 1865, younger brother of A. E. Housman, he attracted attention by his illustrations to Meredith's poem *Jump to Glory*, Jane, Christina Rossetti's *Goblin Market*, and Shelley's *The Sensitive Plant*. His



Laurence Housman.
British poet
and dramatist

anonymous volume, *An Englishwoman's Love Letters*, had an immense vogue in 1900. Other works, charming, fanciful, and free from his brother's pessimism, include *A Farm in Fairyland*, 1894; *Bethlehem*, 1902; *Prunella* (with H. Granville Barker), 1906; *Pains and Penalties*, 1911; *Angels and Ministers*, 1921; *Little Plays* of S. Francis, 1922. Housman published an autobiography, *The Unexpected Years*, 1936; a memoir of his brother, 1937; *Collected Poems* 1938. A series of scenes from the life of Queen Victoria, collected as *Victoria and Albert*, 1933, was followed by *Victoria Regina*, 1934; *Palace Scenes*, 1937; and *Gracious Majesty*, 1941. For some time banned from public performance, *Victoria Regina* was produced at the Lyric Theatre in 1937, with Pamela Stanley in the name part, and was received with enthusiasm, though it was no more than a selection of intimate and imaginative episodes from the queen's private life.

A sister, Clemence (1861-1955), a wood engraver of merit, and a writer, served a short term in Holloway gaol as a "suffragette."

Houssaye, ARSÈNE (1815-96). French writer. Born at Bruyères, Aisne, on March 28, 1815, the family name being Housset, he published his first novel, *La Couronne de Bluets*, in 1836. He was a writer of great versatility, a friend of many notable writers and artists of his day, and during 1849-59 was director of the Thé-

âtre Français. He died in Paris, Feb. 26, 1896. Among his writings may be mentioned studies of Flemish and Dutch art, 1846, and of Leonardo da Vinci, 1869; his life of Mme. du Barry, 1878; a satirical story, *l'Histoire du 41me Fauteuil de l'Académie Française*, 1855; comedies, including *La Comédie à la Fenêtre*, 1859; and novels, mostly of Parisian life.

Houston. The largest city of Texas, U.S.A., and the co. seat of Harris co. It stands on the Houston ship channel, at the confluence of the Buffalo and White Oak Bayous, 50 m. N.W. of Galveston, and is served by rlys., airport, and steamship lines. The newest of the U.S. major shipping centres, Houston has become the world's biggest oil port and the nation's biggest cotton market. Improvement of port facilities, on which £11,250,000 had been spent by 1940, began with the construction in 1914 of the ship channel, 35 ft. deep at its shallowest and 200 ft. wide at its narrowest point. The banks of the channel are lined with oil refineries, chemical plants, steel, cement, and rubber factories, and sugar mills. Nearly all the world's sulphur is obtained within 50 m. of Houston. Within 100 m. are 268 oil fields. Among the products shipped are maize, livestock, rice, lumber, salt, and figs.

The climate is semi-tropical. Notable landmarks are the 37-storey Gulf Building, the federal district court, county courthouse, city hall, museum of fine arts, Sam Houston Coliseum (which seats 20,000), Miller memorial theatre, and Jefferson Davis hospital. Rice Institute, providing higher education free of tuition fees, and the university of Houston are also here. There are 3,000 acres of parks. Houston, founded 1836 and incorporated 1840, was formerly capital of Texas. The city was named after Sam Houston (q.v.). Pop. (1950) 596,163.

Houston, LADY (d. 1936). British patriot. Fanny Lucy, daughter of Thomas Radmall, was born in London. Her second marriage was in 1901, to the 9th Lord Byron (d. 1917). In 1917 she was created one of the first dame commanders of the British Empire for her work in women's welfare. In 1924 she married Sir Robert Houston (d. 1926), a shipping magnate who left a fortune of £6,000,000. Lady Houston gave financial assistance to many patriotic causes: a gift of £100,000 went towards the cost of defending the Schneider Trophy in 1931, and

in 1933 she financed the Mt. Everest air expedition. She died Dec. 29, 1936. A biography by W. Allen appeared in 1947.

Houston, SAM (1793-1863). An American soldier and politician. Born near Lexington, Va., March 2, 1793, of Scottish-Irish descent, he moved to Tennessee and lived among the Cherokee Indians, of whose cause he was a lifelong supporter. When, in 1835, Texas declared itself independent of Mexico and hostilities broke out on the attempted disarmament of the American colonists, Houston was appointed commander of the Texan army. His decisive victory over the Mexicans on the San Jacinto river and the capture of their president, Santa Anna, April 21, 1836, secured the independence of Texas.

Houston sat in congress as senator for the new state when it joined the U.S.A. in 1845. During 1859-61 he was governor. Having refused to swear allegiance to the confederate states or to support the secession movement, he was deposed and retired into private life. He died at Huntsville, Texas, July 25, 1863. The largest city of Texas is named after him. *Consult* The Raven, M. James, 1931.

Houston Line. British steamship company. Founded in 1880 by Robert Houston, the firm is officially R. P. Houston & Co. It was acquired by the Clan Line in 1918. It runs a cargo service from U.K. and U.S.A. ports to S. America and S. Africa. The company was one of the pioneers in the River Plate trade. The head office is at 4, St. Mary Axe, London, E.C.4. *See* Houston, Lady.

Houyhnhnms. In the last part of Swift's *Gulliver's Travels*, a race of horses endowed with reason. They are represented as gentle and gracious, and as ruling over the Yahoos, beings human in shape but brutal in nature. The name, pronounced whin'ims, is probably meant to suggest the neighing of a horse. *See* Swift, Jonathan.

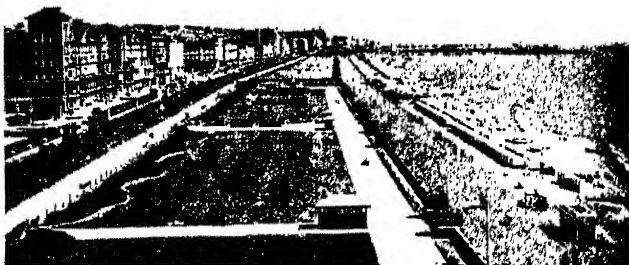
Hova. Name popularly denoting the dominant population of the Imerina highlands of central Madagascar. Short, straight-haired, flat-faced, round-headed, these people derive much of their culture from Indonesian immigrants who probably arrived in the 15th

century. Mingled with the primitive Vazimba, they overturned the negroid Sakalava power, becoming supreme during the 19th century. They comprised three classes: nobles, hova or freemen, and slaves. The abolition by France of local kingship and slavery extended the name hova from the middle class to the whole. *See* Madagascar; Malagasy.

Hove. Borough and seaside resort of Sussex, England. It is

sunshine, many having the habit of hovering in the air on rapidly vibrating wings. The larvae of species of *Syrphus* and its allies destroy plant lice and are therefore beneficial.

Hovey, RICHARD (1864-1900). American poet. Born at Normal, Illinois, May 4, 1864, he first studied for the Church, and then turned successfully to journalism, the stage, and lecturing. In 1893, with Bliss Carman (*q.v.*), he pub-



Hove, Sussex. The sea front, promenade, and lawns looking east; in the distance is seen Brighton's West Pier

51 m. by electric rly. S. of London, and is bounded E. by the co. bor. of Brighton and W. by the urban dist. of Portslade. The attractions include the King Alfred baths erected by the corporation and opened 1946, with two sea water swimming baths, restaurant, sun terraces, miniature rifle range, car park, and indoor bowling greens. There are sea promenades and parks, a county cricket ground, and the Brighton and Hove Albion football ground. Hove received its charter in 1898; it gives its name to a borough constituency. Pop. (1951) 69,535.

Hoveden, ROGEE or (d. 1201). English chronicler. Born at Hoveden, E. Yorks, he became an official at the court of Henry II. Much of his life was passed in the king's service, but he is known only by his Chronicle, a general history of England from 732 to his death in 1201. The last part only is valuable. Until 1169 Roger merely copies other writers; from 1170 to 1192 he follows Benedict of Peterborough, although making additions; but from 1192 the book is original and carefully written. There is an edition in the Rolls series.

Hover-fly (*Syrphidae*). Large family of flies that are active in

lished *Songs from Vagabondia*. A second and third series appeared 1896 and 1900. His separate works were a volume of miscellaneous poems, *Along the Trail*, 1898; a dramatic trilogy, *Launcelot and Guenevere* (*The Quest of Merlin*; *The Marriage of Guenevere*; *The Birth of Galahad*), 1890-98; *Taliesin, a Masque*, 1900; and a posthumous volume, *To the End of the Trail*, 1908. He died Feb. 24, 1900.

How, WILLIAM WALSHAM (1823-97). British divine. Born at Shewsbury, Dec. 13, 1823, he was the son of a solicitor. Educated at Shrewsbury School and Wadham College, Oxford, he was ordained in 1846. Rector of Whittington, Salop, in 1879, he was chosen suffragan bishop under the bishop of London; he took the style of bishop of Bedford, but his district was the east end of London. There he did a great work, founding the East London Church Fund and initiating philanthropic activities. In 1888 he was made bishop of Wakefield, where he remained until his death, Aug. 10, 1897. How wrote several beautiful hymns, *e.g.* For all the Saints, and was of saintly life.



W. W. How, British divine



Hove arms



Houston Steamship Line flag, Union Jack and red cross on white

Howard. Famous English family, now represented by the duke of Norfolk, the earl of Carlisle, the earl of Effingham, the earl of Suffolk and Berkshire, Lord Howard of Glossop, Lord Howard of Penrith, and others. The descent is traced authentically to William Howard, or Haward, a lawyer in Norfolk in the 13th century. He was probably descended from a family that had lands at Wiggshall, near Lynn. He became a justice of the common pleas and a rich man, owning land in his native county. His son John became a knight, a soldier, and the owner of further Norfolk lands.

The great event in the rise of the Howards, however, was when Sir Robert, early in the 15th century, married Margaret, daughter of Thomas Mowbray, duke of Norfolk. Their son John fought for the Yorkists during the Wars of the Roses, and in 1470 was made a baron. He became one of the heirs to the estates of the Mowbrays, and, having received the bulk of them, was in 1483 created duke of Norfolk and earl marshal. From his son, the 2nd duke, the English leader at Flodden, are descended most of the existing lines. The 4th duke married the heiress of the earl of Arundel. One descendant married the heiress of the Dacres, and from that union sprang the earl of Carlisle and other branches of the Howards settled in Yorkshire and Cumberland. See Arundel, Earl of; Carlisle, Earl of; Effingham, Earl of; Mowbray; Norfolk, Duke of; Nottingham, Earl of; Stafford, Earl of; Suffolk, Earl of; Surrey, Earl of.

Howard, CATHERINE. The fifth queen of Henry VIII of England, is entered as Catherine Howard (*q.v.*).

Howard, JOHN (1726-90). British philanthropist and reformer. Born in Hackney, Sept. 2, 1726, he had an indifferent education at Hertford, and at 16 inherited a small property at Cardington, Beds, and a patrimony which rendered him independent. Having



John Howard,
British philanthropist

travelled much abroad, in 1773 he was chosen high sheriff of the county and had to visit Bedford prison. From this date his life work began. He found that not only were prisons unspeakable, but the

gaolers received no pay and had to wring fees out of the prisoners. He secured payment for gaolers by Act of Parliament, and travelled all over the British Isles visiting county and town gaols and bride-wells to expose other evils. In 1775-76 he extended his survey to France, the Netherlands, Germany and Switzerland. Then he published his *State of the Prisons in England and Wales*, to which appendices were added in 1780 and 1784 after further evidence was collected abroad. One result was the introduction of penitentiary houses. Fearlessly exposing himself to hardship, Howard travelled in a plague-ridden ship and went into military hospitals, his *Account of the Principal Lazarettos in Europe* appearing posthumously in 1798. While studying camp fever near Kherson, Russia, he caught the disease, and died Jan. 20, 1790.

The Howard League for Penal Reform, named after him, was founded in Dublin in 1834. First called the Howard Society, and later, under Lord Brougham's presidency, the Howard Association, it was amalgamated in 1927 with the Penal Reform League (founded 1907) under its present title. It seeks to extend psychological treatment for offenders, and to abolish the death penalty. From its offices at Parliament Mansions, Victoria St., London, S.W.1, it publishes the *Howard Journal* and the *Penal Reformer*.

There are memoirs and lives of Howard by T. Taylor, 1836; J. Field, 1850; E. C. S. Gibson, 1901; J. G. Rowe, 1927.

Howard, LESLIE (1893-1943). British film actor. Leslie Stainer was born in London, April 3, 1893, educated at Dulwich, and became a bank clerk. Joining a theatrical touring company after being invalided out of the army, he first appeared in London in 1918, and in 1922 visited New York. In films from 1930 he gained a great following as an actor of quiet sincerity and beautiful diction. His notable pictures, American and British, included *Outward Bound*; *Berkeley Square*; *The Scarlet Pimpernel*; *The Petrified Forest*; *Romeo and Juliet*; *Pygmalion*; *Escape to Happiness*;



Leslie Howard,
British film actor

Gone With the Wind; *Pimpernel Smith*; *The First of the Few*. This last he directed, likewise *The Gentle Sex*, in which he spoke a commentary. Returning from a lecture tour in Spain on behalf of the British Council, he died when the aircraft was destroyed by enemy action, June 1, 1943.

Howard, LUKE (1772-1864). British meteorologist. Born in London, Nov. 28, 1772, he became a chemist, but his fame rests on his classification of clouds. In his essay *On the Modification of Clouds*, 1802, later incorporated in his great work *The Climate of London*, 2nd ed. 1833, he coined the terms cirrus, cumulus, stratus, and nimbus, which are still in use. Howard was elected F.R.S. in 1821. A Quaker, he devoted much of his leisure to religious and philanthropic work, and published a treatise against swearing in 1811. A lifelong friend of John Dalton, also a weather expert, he engaged in a correspondence with Goethe in 1822. He lived until March 21, 1864.

Howard, SYDNEY (1885-1946). An English comedian. Born at Yeadon, near Leeds, Aug. 7, 1885, he joined a concert party, and came to London in the revue *Box o' Tricks* at the Hippodrome, 1919. Real success came in *Hit the Deck*, 1927, and in 1928 he played unforgettably in partnership with Leslie Henson in *Funny Face*. To a ponderous figure and glazed eyes he added a delicacy of movement—especially of the hands—that was irresistibly comic. Other stage appearances were in *It's a Boy*, 1930; *It's a Girl*, 1931; *Night of the Garter*, 1932; *Ladies' Night*, 1933; *Anything Goes*, 1935. Films in which Howard played included *Up for the Cup*; *Up for the Derby*; *Tilly of Bloomsbury*; *The Mayor's Nest*. He died June 12, 1946.

Howard de Walden, BARON. English title borne with intervals since 1597 by the families of Howard and Ellis. In 1597 Lord Thomas Howard, a son of the 4th duke of Norfolk, was made a peer; his mother was the daughter and heiress of Lord Audley of Walden. Howard became earl of Suffolk in 1603, and when the 3rd earl died without sons in 1688 the barony went into abeyance and so remained until 1784. In that year it was allowed to Sir J. G. Whitwell, a soldier who was made Baron Braybrooke; he was descended from a daughter of the 1st Lord Howard de Walden. He died in 1797 and the barony

was next held by the 4th earl of Bristol, a descendant of the 1st lord.

Bristol's great-grandson, Charles Augustus Ellis (1799-1868), succeeded as 6th lord in 1803. He was the son of the earl's granddaughter by her marriage with Charles Rose Ellis, created Baron Seaford in 1826. In 1845 he added the barony of Seaford to that of Howard de Walden, and his descendants have since held both. This 6th lord was British minister at Stockholm, Lisbon, and Brussels. His wife was a sister of the eccentric 5th duke of Portland, and on his death she inherited much London property.

Thomas Evelyn Ellis (1880-1946) succeeded as 8th baron in 1899, and in 1917 assumed the surname of Scott-Ellis. Born to great wealth, he owned property in N.W. London, part of which, in Cavendish Sq., he let to a department store on a 999 years lease after a remarkable lawsuit. A catholic patron of the arts, he wrote plays under the name of T. E. Ellis, also libretti for Holbrooke's operas. Dying Nov. 5, 1946, he was succeeded by his son John as 9th baron.

Howard of Effingham, WILLIAM HOWARD, 1ST BARON (c.1510-73). English diplomatist. Eldest son of Thomas Howard, 2nd duke of Norfolk, and educated at Trinity Hall, Cambridge, he was ambassador to Scotland and France, 1531-41. He was condemned to perpetual imprisonment on a charge of concealing the misconduct of his niece, Catherine Howard (*q.v.*), but pardoned in 1541. Governor of Calais, 1552-53; privy councillor, 1553; lord high admiral, 1554-73, he was raised to the peerage for crushing Wyatt's rebellion, and made a K.G., 1554. He protected Princess Elizabeth against Gardiner, and became her lord chamberlain, 1558. He was appointed lord privy seal, 1572. He died Jan. 12, 1573. His son Charles, the leader against the Spanish Armada, was made earl of Nottingham (*q.v.*).

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Howdah. Seat placed on the back of an elephant. It may hold two or more persons, and is sometimes covered.

Howden. Parish and market town of the East Riding of Yorkshire, England. It lies 21 m. W.

of Hull on the railway. The church of S. Cuthbert dates from the 13th century, the manor house incorporates remains of the palace of the bishops of Durham, and there is a cross in the market place. Roger of Hoveden, the chronicler, was a native; and Thomas Ward, the jockey who became prime minister to the duke of Parma, was a local character. Market day, Sat. Pop. 2,470.

Howe, RICHARD HOWE, EARL (1726-99). British sailor. The second son of the 2nd Viscount



Earl Howe,
British sailor
After Gainsborough

Howe (Irish peerage), he was born in London, March 8, 1726. Entering the navy at 13, he made a voyage to Rio de Janeiro and then was sent to the W. Indies, where he

saw the action of La Guayra in 1743. In 1755, in command of the *Dunkirk*, he sailed for N. America with *Boscawen*, and defeated a French fleet off the St. Lawrence. In 1758 he succeeded his brother as 4th viscount, though from 1757 to 1782 he sat in the house of commons as member for Dartmouth.

In 1759 Howe played a prominent part in Hawke's brilliant action in Quiberon Bay. He was appointed treasurer of the navy in 1765, promoted rear-admiral in 1770, and vice-admiral in 1775. Commander-in-chief in N. America, he took part in the reduction of Long Island and New York, 1776-77, cleared the passage of the Delaware, and defeated D'Esterade off Rhode Island. He was in sympathy with some of the colonists'

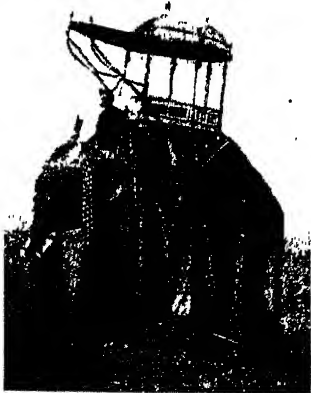
demands and opposed to Lord North's administration, so he spent a few years in retirement near St. Albans, hoisting his flag again in 1782 as admiral commander-in-chief of the Channel. The fleet was ordered to the Mediterranean, and Howe relieved Gibraltar.

In 1783 he was appointed first lord of the admiralty, and in 1788 on his retirement was given an earldom. He was again in 1790 commander-in-chief of the Channel fleet, and whilst occupying this command on June 1, 1794, he engaged the French under Villaret-Joyeuse. Flying his flag on the *Queen Charlotte*, Howe fought a battle that, though it did not destroy the French fleet, led it to avoid major action for two years. In 1796 he was promoted admiral of the fleet. He succeeded in settling the Spithead mutiny, 1797. A skilled tactician and a beloved if grim commander, "Black Dick" died Aug. 5, 1799. The best biography is by Sir J. Barrow, 1838. See First of June.

Howe, FRANCIS RICHARD HENRY PENN CURZON, 5TH EARL (b. 1884). British racing motorist. Born May 1, 1884, he went to Eton and Christ Church, Oxford, was commissioned in the R.N.R., and served in the First Great War in the *Queen Elizabeth*. In 1918 he was elected Unionist M.P. for S. Battersea, and in 1929 succeeded his father in the house of lords. He competed in many important British and Continental races, driving Mercedes, Alfa-Romeo, Bugatti, and Maserati cars. In 1931 he won the Le Mans 24-hour race and in 1934 the gold vase at Brooklands. During the Second Great War he was an instructor in the R.N.V.R.

Howe, ELIAS (1819-67). American inventor. Born at Spencer, Mass., July 9, 1819, he worked for a cotton machinery manufacturer. In 1846, after four years' effort, he took out a patent for a lockstitch machine which is in essentials the foundation of most present-day sewing machines. Coming to England, he sold his English patent rights for £250. He died Oct. 3, 1867. See Sewing Machine.

Howe, JOHN (1630-1705). English Puritan divine. Born at Loughborough, May 17, 1630, he graduated at Cambridge, afterwards holding a fellowship at Oxford. Having taken orders, he was appointed in 1654 to the charge of Great Torrington, Devon, and three years later became domestic chaplain to Oliver Cromwell. He was ejected from Great Torrington in 1662, and spent some chequered



Howdah on the state elephant of the
Maharajah of Mysore

years in England and Ireland before being appointed minister of a Puritan congregation in London in 1675. The persecution of dissenters under James II drove him abroad, but on the publication of the Declaration of Indulgence he returned from Utrecht to be one of the ministers solicited by the king to persuade nonconformists to recognize the dispensing power. Like Baxter and Bunyan, however, Howe proved incorruptible. The author of many religious writings, most of them published after the Revolution, he died April 2, 1705.

Howe, JOSEPH (1804-73). Canadian politician. Born at Halifax, N.S., Dec. 13, 1804, he was the son of a printer who had left the U.S.A. Joseph started a paper in Halifax, became known through his success in a libel action, and in 1836 was returned to the legislature of Nova Scotia. He threw himself heartily into the struggle for responsible government, and when this was granted in 1848 he became a cabinet minister. In 1854 he was made chief commissioner of railways, but did not forsake politics altogether, and during 1860-63 he was premier of Nova Scotia. Howe led the agitation for withdrawal from the federation of 1867, and in 1869 became a minister in the dominion cabinet. He died June 1, 1873, having just been made governor of the province.

Howe, JULIA WARD (1819-1910). American poet and philanthropist. Born in New York, May 27, 1819, she married Samuel Gridley Howe (v.i.). Before the Civil War she edited *The Boston Commonwealth*, the anti-slavery organ, and wrote the famous *Battle Hymn of the Republic*. Afterwards she became a noted advocate of votes for women and of prison reform. Her most important works



Julia Ward Howe.

are *Sex and Education*, 1874; *Life of Margaret Fuller*, 1883; *Representative Women of New England*, 1905. She died Oct. 17, 1910.

Howe, SAMUEL GRIDLEY (1801-76). An American philanthropist. Born at Boston, Mass., Nov. 10, 1801, he was educated at Brown university and Harvard medical school. During the Greek war of independence he served as a surgeon with the Greek army, and

helped the cause by collecting funds in America and organizing relief works at Aegina for the refugees. In 1831, at the instance of a committee formed in Boston to establish an asylum for the blind, Howe visited Europe to study the methods used there, and on his return to Boston in 1832 opened a school for blind children in a private house, with so much success that a state grant was made for its future support. In 1839 the institution was moved to South Boston. Turning his attention to idiocy, Howe became chairman of a commission of inquiry, and in 1848 started a school for idiot youths. He died Jan. 9, 1876.

Howells, HERBERT NORMAN (b. 1892). A British composer. Born at Lydney, Oct. 17, 1892, and trained at Gloucester cathedral and at the Royal College of Music. Orchestral pieces by him were played at promenade concerts in 1920 and 1924, and in 1922 his *Sine Nomine* was performed at Gloucester. His music is unmistakably English without being consciously national; the Tudor influence is recognizable in *Lady Audrey's Suite* and *Lambert's Clavichord*. Other works are *Puck's Minuet*, for small orchestra; *Requiem*, for soloists and chorus; piano concerto, songs, and chamber music.

Howells, WILLIAM DEAN (1837-1920). American man of letters. He was born at Martin's Ferry, Ohio, March 1, 1837, son of a newspaper proprietor. He worked as a compositor in his father's printing office; was a journalist, with a constant literary intention, 1858-61; U.S. consul at Venice, 1861-65; editor of *The Atlantic Monthly*, 1866-81; and editor of *Harper's Magazine*, 1886-91. He was associated also with *The New York Times*, *The Nation*, and *The Cosmopolitan Magazine*. He died in New York, May 11, 1920.

His 70 works include poems, travel books, essays, plays, and criticism. His first book was *A Campaign Life of Lincoln*, 1860. *Venetian Life*, 1866, and *Italian Journeys*, 1867, are delightful transcripts of personal experience. His novels, which reflect analytically the American life of his time, realistically but in proper perspective, include *The Lady of the*



W. D. Howells,
American Author

Aroostook, 1879; *The Undiscovered Country*, 1880; *A Modern Instance*, 1882; *The Rise of Silas Lapham*, 1885; *The Minister's Charge*, 1886; *The World of Chance*, 1893; *The Vocation of the Kelwyns*, 1920. He was a successful short-story writer, a penetrating critic, and some of his poems reflect the qualities of his prose, which is consistently clear, compact, precise, and felicitous. *Consult Life and Letters*, ed. M. Howells, 1929.

Howitt, MARY (1799-1888). A British author and translator. Born at Coleford, Glos., March 12, 1799, daughter of Samuel Botham, a surveyor, and a member of the Society of Friends, she spent her early years at Uttoxeter. There on April 16, 1821, she married William Howitt (v.i.), with whom she wrote *The Desolation of Eyam and Other Poems*, 1827. In 1837 began her series of tales for children, popular on both sides of the Atlantic. She translated Frederika Bremer's novels, 1842-63; and many of Hans Andersen's tales, 1845-47. She collaborated with her husband in *The Literature and Romance of Northern Europe*, 1852. Later she was received into the Church of Rome. She received a civil list pension of £100 in 1879, and died in Rome, Jan. 30, 1888. Her *Autobiography* was edited by her daughter Margaret, 2 vols., 1889.

Howitt, WILLIAM (1792-1879). British writer. Born at Heanor, Derbyshire, son of a yeoman farmer, who was a member of the Society of Friends, he was educated at the Friends' school at Ackworth and at Tamworth. He married in 1821 Mary Botham, and in 1823, with his wife, made a pedestrian tour of Scotland. For a time he was in business as a chemist and druggist in Nottingham. He travelled in Australia, 1852-54. Among his voluminous writings, the more noteworthy are *The Book of the Seasons*, 1831, which ran into seven editions;



William Howitt,
British author

Rural Life of England, 1838; Homes and Haunts of the Most Eminent British Poets, 1847; Popular History of England, 1856-62; History of the Supernatural, 1863; The Northern Heights of London, 1869. He died in Rome, March 3, 1879.

Howitzer (Ger. *Haubitzer*, catapult). Short-barrelled gun discharging heavy projectiles at a high angle of elevation and trajectory. Howitzers have been in use since the 16th century, and were first designed as mortars for throwing solid shot over the battle-mented walls of fortifications.

The howitzer is of lighter construction than a long range field gun; one throwing a projectile weighing 45 lb. weighs less with its mounting than does a field gun firing an 18-lb. shell. The length of a howitzer barrel rarely exceeds 12 times its calibre, and the muzzle velocity is usually about 1,000 ft. per second. On account of the high angle of elevation at which a howitzer fires, the projectile strikes the target at a correspondingly steep angle of descent; consequently the weapon can destroy gun emplacements despite heavily protected roofs. The high trajectory of a howitzer shell makes it possible for the gun to fire over obstacles between gun and target. The lower chamber pressure in the gun enables the shells to have thinner walls and base, and thus to contain a greater weight of explosive than the ordinary artillery shell. Excessive recoil is absorbed by hydraulic buffers.

In both Great Wars the Germans, specialising in howitzers, developed remarkably efficient weapons. Howitzers of 17-in. calibre destroyed the Belgian and French frontier forts in 1914. In the Second Great War the belligerent armies used examples ranging from 3.7 ins. to 18 ins. Howitzers up to 6-in. calibre were mounted on tanks and used for the close-range reduction of strongpoints. The U.S. army built a tank-mounted howitzer capable of throwing a 360-lb. shell to a distance of 16 m. The modern trench or field mortar is a howitzer on a small scale. See *Ammunition*; *Artillery*; *Explosives*; *Mortar*; *Ordnance*.

Howling Monkey (*Alouata*). Genus of monkeys found in Central and S. America, and especially in the forest regions of Brazil. The hyoid bone at the upper extremity of the windpipe is enormously developed, enabling the animals to produce a howling sound out of all proportion to

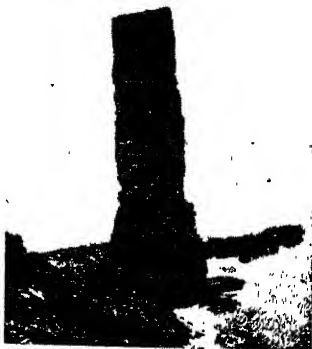
their size. They have long, prehensile tails, and ugly, naked faces surrounded by long hair. See *Monkey*.

Howrah. District and town of the state of West Bengal, India. The area of the district is 561 sq. m. Rice is the most important crop. The district is a great industrial centre, containing cotton, jute, and other factories, engineering workshops, ironworks, dockyards, and similar undertakings. The exports include rice, hides, cotton goods, bricks, and ropes; imports are European piece goods and wheat.

Howrah city, a small village in the 18th century, is now an important manufacturing town on the right bank of the Hooghli, opposite Calcutta. It is the terminus of rlys. from Bombay, Peshawar, and Assam, and gives its name to the New Howrah bridge across the Hooghli, linking Howrah and Calcutta, which was opened to traffic Feb., 1943. Pop. (1951) dist., 1,611,373; city, 433,630.

Howth. Parish and seaport of co. Dublin, Irish Republic. It is on a promontory forming the N. side of Dublin Bay, 8 m. by rly. N.E. of the capital. The Hill of Howth rises to 562 ft. Here in July, 1914, the Irish Volunteers landed rifles and ammunition despite the interference of a British regiment. Returning to Dublin, the soldiers, being harried by a mob in the city, opened fire, killing three people and wounding 38. This was the first armed clash between troops and populace in seven years of trouble. Pop. 4,000. *Pron.* Hoath.

Hoxton. Suburb of N. London. Known formerly as Hogsden, Hogsdon, Hoggesdon, Hoggston, and Hocheston, it is in the bor. of Shoreditch. It is traversed from S. to N. by New North Road, and



Hoy, Orkney Islands. The Old Man of Hoy, a pillar of rock on the north-west coast

has Kingsland Road on the E. The L.C.C. technical institute, formerly Aske's Haberdashers' School, marks the site of almshouses and schools founded by Robert Aske, alderman and haberdasher, in 1688. A mansion known as Balme House in the 17th century, and rebuilt by Sir G. Whitmore, was once the residence of Richard de Beauvoir, whose name is preserved in that of Dr Beauvoir Town; it became a private lunatic asylum, of which Charles and Mary Lamb were inmates. The Geffrye Museum (*q.v.*) in Kingsland Road occupies the site of almshouses founded in 1715 by Sir Robert Geffrye; the old chapel remains. In Hoxton Fields Ben Jonson killed his fellow player Gabriel Spencer in a duel in 1598. The Britannia Theatre, rebuilt 1858, was destroyed in an air raid in 1941. Hoxton is a centre of the cabinet-making industry.

Hoy (from Dutch *hul*, hulloo). Single-masted sailing vessel originally used as a ferry for taking passengers from shore to an ocean-going ship. It was hailed by any person desiring passage, hence its name. A larger type of vessel with the same name was used for carrying passengers and goods on short coastal journeys. Hoys still carry goods between ship and shore where there is no port and the shallow water prevents sea-going vessels from coming close in.

Hoy. Second largest of the Orkney Islands, Scotland, and situated about 2 m. S.W. of Pomona. Its extreme length is 13½ m., extreme breadth 8 m., and area 53 sq. m. The highest summit is Ward Hill (1,565 ft.), 2 m. from which is the famous Dwarfie Stone, referred to in Scott's *Pirate*, 6½ ft. high, with its hollowed-out chambers. Long Hope, on the S. coast, is a good natural harbour. The Old Man of Hoy (450 ft.) is a detached pillar-shaped rock off the N.W. coast. From this point to Berry Head in the S.W. are fine cliffs of red sandstone, over 1,000 ft. high.

Hoylake. Town and sub-dist. of Cheshire, England. On the Dee, at the entrance to the estuary, on the peninsula of Wirral, it is 8 m. W. of Birkenhead and is served by the Wirral electric rly. Here are the golf links of the Royal Liverpool club, opened in 1869 and the scene of championship matches. The urb. dist. of Hoylake includes West Kirby. Pop. (1951) 30,936.

Hoyland, NETHER. Urban dist. of the W. Riding of Yorkshire, England. It is 5½ m. S. by E. of

Barnsley, with a rly. station, and has collieries and a clothing factory. Pop. (1951) 15,707.

Hoyle, EDMOND (1672-1769). English writer on games. He is said to have been a barrister; was certainly giving lessons on whist in London in 1741; and died at Welbeck Street, London, Aug. 29, 1769. The first to write scientifically on any game, he systematised the theory of whist in his *Short Treatise*, 1742. He published works on piquet, quadrille, brag, backgammon, and chess. Hoyle's rules and doctrines have been constantly enlarged by editors and the phrase "according to Hoyle" refers to him.

Hradec Králové. Town of Czecho-Slovakia, known historically by its German name Königgrätz (*q.v.*).

Hrdlicka, ALES (1869-1943). American anthropologist. Born at Humpolec, Bohemia, March 29, 1869, he studied in New York and Paris. Having qualified as a doctor, he made investigations in mental pathology and anthropology, 1894-99; and joined several American natural history museum expeditions, 1898-1903. In the physical anthropology division of the national museum at Washington he became assistant curator, 1903, and curator, 1910. He journeyed to Egypt, the Balkans, Siberia, Mongolia, and all over the New World. Among his publications are *Early Man in N. America*, 1907; *Early Man in S. America*, 1912; *The Peoples of the Soviet Union*, 1942; *Alaska Diary* (1926-31), 1943. He died Sept. 5, 1943. *Pron.* Dlitska.

Hron (Ger. Gran). A river of Hungary. Rising near the Low Tatra, it flows W. and then S., reaching the Danube just below Esztergom, after a course of 150 m.

Hroswitha, ROSWITHA, OR HROTSVITH (c. 935-1000). German poet and dramatist. A Benedictine nun of Gandersheim, she wrote religious poems in Latin, versified church legends, and also wrote six comedies modelled on those of Terence, but of a wholesome Christian tone. Her works were published in 1858, ed. K. A. Barack. The comedies and her epic, *Otto*, have been rendered into German. Anatole France mentions the performance of the comedies in Paris.

Hsi-kiang. See Si-kiang.

Hsingan. Name of a former prov. of China, absorbed in Inner Mongolia prov. It bordered the U.S.S.R. and Outer Mongolia. Hulun was the capital. The area

is generally mountainous and includes the thickly forested Ta Hsinganling range. It is sparsely inhabited—about 12 to the sq. m. The Changchun rly. runs through the area.

Hsingking. Japanese form of the name of the Manchurian city of Changchun (*q.v.*).

Hsuan Tsang (c. 605-664). A Chinese traveller. Born near Honan Fu, he became a Buddhist monk and early gained a reputation for wisdom and piety. He undertook alone the perilous journey to India in order to visit the sacred scenes and procure Indian books of devotion. Crossing the Gobi desert, despite great hardships, he reached Peshawar, visited the principal Buddhist shrines, and learned Sanskrit. After several years spent in travel in India he passed on to Assam and thence made his way to Kabul. At the command of the emperor Tai Tsing, he wrote an account of his travels in 648.

Huacho. Seaport of Peru, 70 m. N.N.W. of Callao, where ocean liners call frequently. It is connected with Lima by rly. via Ancon and is on the Pan-American Highway. It has cotton-seed oil and sugar mills. Pop. 13,000.

Huallaga. River of Peru, a headstream of the Amazon. It rises in the Andes, at an alt. of 13,000 ft. above sea level, in about lat. 10° 42' S., and takes a generally N. course to join the Marañon. Its upper valley between the E. and Central Cordilleras is the province of San Martin. Its length is about 670 m. It is navigable for shallow craft for about 350 m., but larger vessels cannot get beyond Laguna, only 30 m. from its junction with the Marañon.

Huancavelica. Dept. and town of Peru. The dept. is bounded on the N. by Junin and lies W. of Ayacucho, E. of Lima. A mountainous region traversed by the Andean system, it is rich in gold, silver, copper, lead, and mercury. Area, 8,300 sq. m.; pop. 317,000. Huancavelica, the capital, is a mining town, with extensive smelting works. The quicksilver mines in the vicinity were first worked in 1566, and are still important. Pop. 8,000.

Huancayo. A town of Peru, capital of the dept. of Junin. On the central highway from Lima to Cuzco, it is also served by rly. and has a daily air service. It is the centre of important mining and agricultural districts. It lies at a height of 10,500 ft. above sea level. Pop. 35,000.

Huanchaca. Town of Bolivia, in the dept. of Potosi. It stands at an elevation of 13,450 ft. above sea level, 84 m. S.W. of Potosi, on a branch line from the rly. connecting with Antofagasta in Chile. It is the chief silver mining centre in Bolivia.

Huang Hsü OR KHWANG HSÜ (1872-1908). Emperor of China. Nephew of the emperor Hien-fang, he was born Aug. 2, 1872, and in 1875 was proclaimed emperor, his name being changed from Tsai-t'ien. The regency was vested in the dowager empresses, Tsze Tsi, his aunt, and Tse An, widow of his predecessor, and on the death of Tse An, in 1881, his aunt ruled supreme, with Li Hung-chang as principal adviser. After the defeat of China by Japan, 1894-95, Huang Hsü tried to free himself from his aunt's power, but in 1898 she organized a *coup d'état* and seized and imprisoned him. He died Nov. 14, 1908.

Huánuco. Dept. and town of Peru. The dept. is bounded on the W. by Ancash and on the S. by Junin. The surface is mountainous, being traversed by the Eastern Cordillera. Gold, silver, and quicksilver are common, and the extensive forests yield valuable timber. Mining and agriculture are the principal occupations. Area, 15,430 sq. m.; pop. 326,000. Huánuco, the capital, stands in a beautiful valley, at an alt. of over 6,000 ft. Pop. 10,000.

Huaraz. A city of Peru, the capital of the dept. of Ancash. It stands on the river Huaraz, at an alt. of 10,000 ft., 183 m. N. by W. of Lima, and is connected by motor road and rly. with Chimbote. Pop. 20,000.

Huascaran. Twin-peaked volcano of Peru, in the dept. of Ancash. It is the loftiest mountain mass in the Peruvian Andes. Alt. 22,000 ft.

Huayna-Capac (reigned 1493-1525). Inca ruler of Peru. During his reign the Inca empire reached its maximum extent. Some walls of his palace, of fine masonry, still to be seen in Cuzco, remain as an interesting record of the Inca period.

Hubbard. Glacier or ice mass of Alaska, U.S.A. It descends from Mt. Hubbard to the head of Yakutat Bay. The mountain reaches an elevation of 12,065 ft.

Huberman, BRONISLAW (1882-1947). Polish violinist. A Jew, born in Czenstochowa (then in Russia), Dec. 19, 1882, he went, at 10, to Berlin to study under Joachim, but through poverty had to give a series of concerts. Patti

heard him in London in 1894, and introduced him to Vienna, where he had a success and won the admiration of Brahms. There followed a career as a virtuoso, his approach being intellectual and his tone lacking something in sweetness. Intensely alert to politics, Huberman wrote on Pan-Europeanism, and led the musicians' opposition to Hitler. He founded and financed the Palestine orchestra, persuading Toscanini to direct concerts. He died June 15, 1947.

Hubert (656-727). French saint and bishop. A nobleman of Aquitaine, he spent his youth at the court of Theodoric III. One day, when hunting, he saw a stag with a cross growing between his antlers, which brought about his conversion. He then became a monk, was ordained, and later was successively bishop of Maastricht and Liège. He did much to promote Christianity among the tribes in the forest of Ardennes. He is the patron saint of hunters. His festival is kept on Nov. 3.

Hubertusburg, TREATY OF. Peace signed Feb. 15, 1763, between Prussia and Austria, which ended the Seven Years' War. England, France, and Spain having just come to terms, representatives of the other powers met at Hubertusburg, in the castle of the elector of Saxony, Austria's ally. The demands of the empress Maria Theresa were rejected by Frederick the Great and in the end peace was made on the basis of the *status quo*, Austria thus giving up all hope of regaining Silesia. Frederick promised to evacuate Saxony, and to do his best to make Joseph, Maria Theresa's son, the next emperor. The castle of Hubertusburg, 6 m. E.N.E. of Grimma, Saxony, E. Germany, was built c. 1720 by the elector Augustus. It is now a public building. See Seven Years' War.

Hubli. City of India, in Dharwar district, Mysore (formerly in Bombay). It is a trade centre; its chief industry is the manufacture of cotton goods. Pop. (1951) 129,609.

Hübnerite. Ore mineral of tungsten; a member of the mineral series ferberite-wolfenite-hübnerite. This series consists of isomorphous mixtures of pure ferberite (iron tungstate) and pure hübnerite (manganese tungstate, $MnWO_4$). The term sometimes includes all members containing more than 80 p.c. of the hübnerite molecule. See Wolframite.

Huc, ÉVARISTE RÉGIS (1813-60). French missionary and traveller. Born at Toulouse, Aug. 1, 1813, he

joined the Lazarist Fathers, 1839, and after a sojourn in N. China made an adventurous journey to Lhasa, accompanied by Joseph Gabet and a converted Tibetan lama. Compelled by Chinese influence to go back to Canton, he returned to France in 1852, visiting Rio de Janeiro, India, Egypt, and Palestine on the way. His *Souvenirs d'un Voyage dans la Tartarie, le Thibet, et la Chine*; and *Le Christianisme en Chine, en Tartarie, et en Thibet*, published 1844-58, were quickly translated into English. Huc died in Paris, March 31, 1860. *Consult* Père Huc et ses Critiques, Prince Henry of Orleans, 1893.

Huch, RICARDA (1864-1947). German novelist and essayist, b. at Brunswick, July 18, 1864. She studied at Zürich and in 1891 was appointed its librarian. She married first an Italian physician, and, in 1906, her cousin, the lawyer Richard Huch. Gaining reputation as a poetess under a pseudonym, from 1893 she rapidly climbed to the first rank of contemporary novelists. Many of her romantic stories have an Italian, some a Renaissance, setting. Her historical, philosophical, and religious writings deal with Luther, Garibaldi and the *Risorgimento*, Baron Stein, and Bakunin; *Alte und Neue Götter*, 1930, was her last large scale work. The first woman to receive the Goethe prize, she died Nov. 17, 1947.

Huckaback. Linen or partly linen fabric with slightly roughened surface and sometimes a damask-like pattern, used for towels, etc.

Huckleberry. Fruits of several low shrubs of the genus *Gaylussacia*, of the family Ericaceae. Natives of N. America, the plants resemble and are nearly related to the whortleberries and cranberries (*Vaccinium*).

Huckleberry Finn, THE ADVENTURES OF. Story by Mark Twain, published 1884, and noticed more fully under Tom Sawyer, The Adventures of—of which book it is a sequel.

Hucknall. Market town and urban dist. of Nottinghamshire, England. It is 8 m. N. of Nottingham, and has stations (London Midland region) on two rlys. Around it are coal mines, while another industry is the making of hosiery. Near is Newstead Abbey (*q.v.*), the home of Lord Byron, who is buried in Hucknall church. Marketday, Fri. Pop. (1951) 23,213.

Hucks, BENFIELD CHARLES (1884-1918). British pioneer airman. Born in Essex, he was edu-

cated as an engineer, and gained his flying certificate in 1911. He made the first there-and-back flight across the Bristol Channel, 1911; in Nov., 1913, after consultation with Blériot and training in France, was the first Englishman to loop the loop; and in 1913-14 drew crowds to his demonstrations of acrobatic flying. He did valuable work as a test pilot in the First Great War. Hucks died of pneumonia, Nov. 6, 1918.

Huckster. Petty dealer in small wares, either itinerant or trading at a shop or booth. The term has been applied specifically to small traders who retail farm produce bought at the market. The word, formerly used for a broker or middleman, is now often applied disparagingly to one who has an eye for a petty bargain.

Huddersfield. County borough of the West Riding of Yorkshire, England.



Huddersfield arms

It stands on the Colne, 16½ m. S.W. of Leeds and 25½ m. N.E. of Manchester by rly. It is also served by canals. The chief buildings are the church of St. Peter, rebuilt in the 19th century, the town hall and municipal buildings, a fine public library, and an art gallery. There are a market hall, an infirmary, and the Ravensknowle museum. Among the schools are Huddersfield college, girls' high school, the Almondbury grammar school, and a technical school. The parks include Greenhead and Beaumont.

Huddersfield's staple industry is the making of cloth and worsted; others are the manufacture of cotton goods and machinery, iron founding, and engineering. Here are large works producing dyes and chemicals. The corporation owns the baths, cemeteries, markets, and abattoirs. There are trolley and motor bus services within the town and from it to neighbouring places.

Huddersfield existed in Anglo-Saxon times, but remained a village until the 17th century. In 1599 William Ramsden became lord of the manor, and his descendants were the principal landowners until 1920, when the corporation purchased over 4,000 acres for £1,300,000. In the 17th century the manufacture of woolen goods was introduced and with the advent of steam the town became a manufacturing centre. Consequently its streets, buildings,

and general appearance are modern. Huddersfield became a municipality in 1868. It forms two borough constituencies. In 1919 it was granted a court of quarter sessions. Huddersfield Town, a famous football club, headed the championship table in three successive seasons, 1925-27. Market day, Tues. Pop. (1951) 129,021.

Hudibras. Satiric poem by Samuel Butler originally published in three parts, 1663-78. The story, which is merely the peg on which the poet hung his satire against the Puritans in particular and the Commonwealth supporters in general, tells how Sir Hudibras and his squire Ralpho set out to put down a bear-baiting, and of how Hudibras wooed his lady and fought the conjuror Sidrophel. It is written mostly in easy octosyllabic couplets with at times extraordinarily forced rhyming; hence this kind of verse has come to be termed Hudibrastic.

Hudson. Twin-engine reconnaissance bomber used by the Allies in the Second Great War. Built by the Lockheed Aircraft corporation as a conversion of the Lockheed 14 air-line transport, it was the first, and one of the most successful, military aircraft ordered in the U.S.A. for the R.A.F., being used extensively by Coastal Command. The majority of Hudsons were flown across the Atlantic to the European and Mediterranean theatres of war.

Hudson. Chief river of New York state, U.S.A. Rising in the Adirondack Mts., it flows generally S. for about 300 m., entering New York Bay by an estuary commonly called North river. Its banks in places are backed by lofty hills, notably the Catskills below Albany and the Highlands below Newburgh, where the river traces its course for about 15 m. through heights of 1,500 ft. Below the Highlands it broadens into Haverstraw Bay, then the Tappan Sea, and farther down the Palisades, a mass of trap rock, line its bank for nearly 20 m. and reach to 550 ft. Falls occur in the upper reaches, Glens Falls descending 50 ft.

The Hudson is tidal and navigable for large ships to Troy, 150 m. from

its mouth. Below Albany it is an estuary. Its chief tributaries are the Mohawk, Sacandaga, and Wallkill. From 59th Street, New York, to the Battery, the Hudson assumes its character as a component of a great port. Berths for ocean liners cover the New York shore, facing industrial plants and docks on the New Jersey side. Ferryboats, freighters, and tugs crowd the river. Besides ferries, there are vehicular and rly. tunnels and bridges. Other large cities on its banks are Jersey City and Hoboken. Higher up are Poughkeepsie, Kingston, West Point, and Ossining. The commercial value of the Hudson is increased by the Erie Canal, which joins it to Lake Erie, and part of the New York state barge canal.

Discovered in 1524 by Verrazano, it was explored in 1609 by Henry Hudson, after whom it is named, and on it in 1807 steam navigation was first exploited by Robert Fulton. Historically, the valley of the Hudson was the great route from the Atlantic seaboard to the W. of the Appalachian highlands. The Hudson Gap or the Hudson-Mohawk Pass provided the only easy gateway to Montreal or Buffalo, and so was a key in the early struggles between British and French and in the War of Independence.

Hudson. City of New York, U.S.A., the co. seat of Columbia co. It stands at the head of deep-water navigation on the Hudson river, 28 m. S. of Albany, and is served by rlys. Its institutions include a state armoury. Industries are concerned with machinery, clothing, Portland cement, lumber, hosiery, knitted goods. Settled in 1783, Hudson received its charter, one of the state's oldest, in 1785. A port of entry in 1790, it was until the war of 1812 a foreign trade centre and the base of a whaling fleet. Pop. (1950) 11,629.



Hudson River, U.S.A. View up the river from West Point, 50 miles north of New York City

Hudson, ROBERT SPEAR HUDSON, VISCOUNT (1886-1957). British politician. He was educated at Eton and Magdalen College, Oxford, became an attaché in the diplomatic service in 1911, and was a first secretary, 1920-23. Conservative M.P. for Whitehaven, 1924-29, for Southport, 1931-52, Hudson was minister of Pensions, 1935-36; minister of Shipping, 1940; and minister of Agriculture and Fisheries, 1940-45. He was made a privy councillor in 1938, C.H. in 1944, and raised to the peerage as Viscount Hudson in 1952. He died in Southern Rhodesia, Feb. 2, 1957.

Hudson, GEORGE (1800-71). British financier. Son of a Yorkshire farmer, he became an apprentice and then partner in a drapery firm in York. A legacy of £30,000 was invested by him in the North Midland rly., and in 1837, when lord mayor of York, he became chairman of the newly organized York and N. Midland rly. Lines from York to Newcastle and Edinburgh were constructed under his influence, and more than 1,000 miles of line were under his control during the railway mania of 1844, at which time his holdings amounted to £320,000.



George Hudson, British financier After F. Grant

An issue of stock on the amalgamation of the Newcastle and Berwick and Newcastle and N. Shields rlys. gave Hudson an opportunity of appropriating £145,000, by omitting to enter the increase of issue in the company's books. In 1847, when the inevitable slump occurred, this and other dishonest transactions were brought to light. No legal action was taken against him, but he was obliged to go abroad. He was M.P. for Sunderland 1845-59. The "railway king" died Dec. 14, 1871.

Hudson, HENRY (d. 1611). English sailor. The son probably of a London merchant, he sailed on the *Hopeful* in 1607 in the service of the Muscovy Company in search of a N.E. passage to the Spice Islands, and touched at Greenland and Spitsbergen. In 1609 he set out from Amsterdam in the service of the Dutch E. India Co., in the *Half Moon* of 80 tons, with a crew of 20, crossed the Atlantic, and explored the Hudson river. In 1610 he sailed again to find a

North-West passage, investigated the bay later called after him, and was there caught in the ice.



Henry Hudson,
English sailor
From an old print

Hudson, WILLIAM HENRY (1841-1922). British author and naturalist. He was born near Buenos Aires, Aug. 4, 1841, and did not leave Argentina for Europe until 1874. In England he lived obscurely, supporting himself as a free-lance writer. He died Aug. 18, 1922.



W. H. Hudson,
British author
Elliot & Fry

Hudson's books show him to have been as close a student of his fellow man as of nature. He tries to bring before his readers the charm of the unknown, and to emphasise that the pleasure derived from discovering things for oneself is infinitely greater than that gained from books. Even in ornithology, his chief subject, he remained an amateur.

The Purple Land that England Lost, 1886, is a romance of Uruguay. It was followed by Argentine Ornithology, 1888-89 (with P. L. Sclater); The Naturalist in La Plata; Idle Days in Patagonia. Then came British Birds; Nature in Downland; Birds and Man. El Ombu, 1902, marks a return to stories of adventure in S. America; Hampshire Days, 1903, dwells on the delights of the New Forest; Green Mansions, 1904, is a romance set on the upper Orinoco; Afoot in England, 1909, contains appreciations of the open country and wonderful pictures of home life in rural districts. Hudson's other works include A Shepherd's Life; the autobiographical Far Away and Long Ago; The Book of a Naturalist; lastly, A Hind in Richmond Park.

He is commemorated by the bird sanctuary in Hyde Park, where Epstein carved the figure of Rima (in Green Mansions). Hudson's Letters, ed. E. Garnett, appeared in 1923; consult also

W. H. H.: a Portrait, M. Roberts, 1924; W. H. H.: The Vision of Earth, R. Hamilton, 1946. See Rima.

Hudson Bay. Inland sea of N.E. Canada. Named after Henry Hudson (*q.v.*), who explored it in 1610, it is entered from the Arctic by Fury and Hecla Strait and Fox Channel, and from the Atlantic by Hudson Strait, its S. extremity narrowing into James Bay between Ontario and Quebec. Its length (including James Bay and Fox Channel) is 1,300 m., its breadth 590 m., and its area 567,000 sq. m. The drainage basin has an area of 1,486,000 sq. m., the principal rivers being the Nelson, Churchill, Hayes, Albany, Severn, Nottaway, Rupert, East Main, Great and Little Whale. Owing to drift and shore ice, safe navigation through Hudson Strait lasts for only three months of the year, but it is considered practicable with ice-breakers to maintain navigation from mid-June to the end of Oct. The only good harbour is Port Churchill.

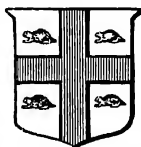
The Hudson Bay rly., from Lo Pas (Manitoba) to Churchill, has reduced the route from Winnipeg and from Edmonton to Liverpool by 500 and 1,000 miles respectively. The great value of this route is that it lessens rly. congestion when the newly harvested

wheat is sent E. from the Canadian prairie. The shores of the bay are dotted with posts of the Hudson's Bay Company, to which the natives bring their furs.

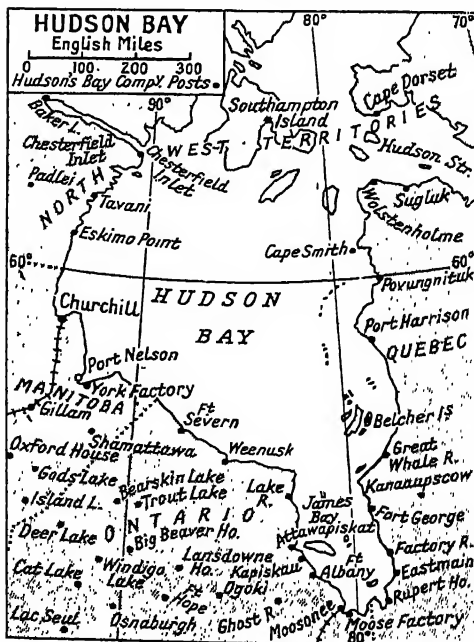
Hudson's Bay Company. Trading organization in Canada. In 1670 England had colonies on the Atlantic coast of N. America, in the district known as New England, while France had some along the St. Lawrence. Behind these was a vast country inhabited only by Indians and visited, mainly for furs, by a few white men. When the question of ownership arose after French depredations at Port Nelson in 1682, the English claim to Hudson Bay was based on the discoveries of Captains Davis, Hudson, Foxe, and others.

Those interested in the fur trade, however, were not indifferent to the fate of the almost useless land around Hudson Bay, and to some of them Charles II, in 1670, made a grant. He gave his cousin, Prince Rupert, and 17 other noblemen and gentlemen "the sole trade and commerce of all those seas, straits, bays, rivers, lakes, creeks, and sounds in whatever latitude they shall be, that lie

within the entrance of the strait commonly called Hudson Strait together with all the land, countries, and territories upon the coast, and confines of the seas, bays, . . . aforesaid." The prince and his associates were called the governor and company of Adventurers of England trading into Hudson Bay; and the vast district granted to it was called Rupert's Land and also the Hudson's Bay Territories, and its first settlements were trading posts built at the mouths of rivers running into



Hudson's Bay
Company arms



Hudson Bay. Map of the Canadian inland sea, showing the stations of the Hudson's Bay Company
Courtesy of Hudson's Bay Company

James Bay at the S. end of Hudson Bay.

The company began to trade in fur with the Indians, and there was a good deal of trouble, often bloodshed, between its servants and the French, also seeking for furs. Its position was strengthened when, by the treaty of Utrecht in 1713, France ceded the whole of the Hudson Bay region to England. In 1749 a parliamentary inquiry was held into its affairs, but its privileges were confirmed. After Canada became an English possession, in 1763, the rival North-West Company of Montreal sent agents into the W., and early in the 19th century there was serious trouble around the Red River. Some fighting occurred, especially in 1816, but in 1821 the two companies were amalgamated. In 1821 George IV gave the united company, still known as the Hudson's Bay Company, the exclusive right of trading with the Indians in those parts of N. America which had hitherto been outside its operations.

Further Trading Areas Granted

These included the Mackenzie, Peace, and Athabaska valleys. In addition, there was the vast territory W. of the Rocky Mts., stretching approximately from what is now the N. of British Columbia to what is now S. Oregon, but in this area the company had to share its rights with American citizens in accordance with an agreement for joint occupancy made between the British and American governments in 1818. In 1846 the boundary between British and American possessions W. of the Rockies was fixed at the 49th parallel; and the trade of the district S. of that line was lost to the Hudson's Bay Company. In 1843 the British government granted Vancouver Island to the company for the purpose of founding a colony, but the grant was withdrawn in 1849, the island becoming a crown colony. At the same time the licence of exclusive trade in the N.W. Territories, first granted by George IV, was allowed to lapse.

At this time Ontario and Quebec were increasing in population and importance, and it was clearly impossible for something like 2,300,000 sq. m. of land, nearly two-thirds of the whole country, to remain in the possession of a single company. In 1857 parliament appointed a committee, which recommended that the Red River and Saskatchewan districts should be given up "on equitable principles," but that the company's

trading privileges should remain untouched. In 1867 the first parliament of the newly formed dominion of Canada expressed the desire to include the district under its authority.

In 1869 the company agreed to surrender its lands, which became the property of Canada as a whole, and out of which three provinces were afterwards carved. As compensation it received £300,000 and a good deal of fertile land, as well as a small piece adjoining each of its trading stations. The so-called fertile belt, now the S. part of the three prairie provinces, consisted of about 140,000,000 acres, of which one-twentieth was reserved for the company. The exact arrangements were completed in 1872. This land made the company one of the largest landholders in Canada, and since 1872 it has been engaged in developing and selling it. As a fur trading corporation the company has continued its operations without hindrance; but for some time the bulk of its profits have been derived from general trading.

From 1889 until his death in 1914 Lord Strathcona was the governor. During the First Great War the company was appointed purchasing agent for the French military administration, and transported foodstuffs for the French civil population. An agency was maintained at Archangel, and munitions from France for Russia and Rumania were sent there.

Since 1931, when Sir Patrick Ashley Cooper became governor, the company's affairs in Canada have been under an administration whose chief officer is the managing director for Canada. This committee is responsible to the board in London. The company is known in the cities of Canada for its departmental stores, the principal ones being at Winnipeg, Edmonton, Calgary, Victoria, Vancouver, and Saskatoon. It has fur trading posts throughout the Canadian Arctic. Wholesale activities are centred in Winnipeg and Vancouver, and include the sale of tea, coffee, tobacco, and blankets. During the Second Great War the company discontinued its London fur auctions, but in 1946 they were resumed. Consult The Honourable Coy., D. MacKay, 1936.

Hudson's Bay Territories. Name given to the district, now the northern part of Canada, at one time the property of the Hudson's Bay Company (*v.s.*). In 1858 British Columbia was formed out of the territories, and in 1869 the

whole was taken over by the crown and called the North-West Territories (*q.v.*).

Hudson Strait. Broad channel between the Canadian prov. of Quebec and Baffin Island. It connects the N. Atlantic with the Arctic Ocean, through Hudson Bay and Fox Channel. Its length is about 500 m. and it is from 80 m. to 140 m. broad. The strait has a depth varying between 100 and 140 fathoms, and contains numerous islands. Ungava Bay is a large indentation on the S. shore. A tidal range of 64 ft. is recorded, and 40 ft. at spring tides is usual; the strait is never frozen, but is blockaded by drift ice which prevents navigation except for a short period in summer.

Hué (Chinese, Thua-Thien). Town of Vietnam, cap. of Central Vietnam (Annam). On the left bank of the Huong-giang or Hué, a few miles from its mouth in the China Sea, it is built on what is virtually an island, the river flowing on three sides and a canal cutting off the fourth. It has rly. connexion with Tourane and Hanoi. Hué fell to the French in 1883 and became the seat of the French resident-general. Its European quarter and the dwellings of the upper classes are on the right bank connected by an iron bridge with the citadel. In the vicinity are the sarcophagi of the ancient rulers. Pop. 13,056.

Hue and Cry. In early English law, term given to the procedure adopted to secure the arrest of a criminal. The constable of the parish, on information of a crime being laid, and any other person discovering a felony, might call upon the inhabitants to follow in the tracks of the suspected criminal, and when the pursuit reached the borders of the next parish the hue and cry was passed on in turn to its constable. No defence was permitted to persons taken by hue and cry if evidence of guilt was found on them. In old French *hu et cri*, the term is derived from *huer*, to hoot or raise a cry, and *crier*, to cry.

Hueffer, FORD MADDOX. This British writer adopted Ford as his surname in 1923. See Ford, F. M.

Huehuetenango. Dept. in the W. of Guatemala. Mountainous and well watered, it produces lead, coffee, sugar, wheat, oats, and maize. The capital is Huehuetenango, near the sources of the Chiapas and Cajabon rivers, in a fertile plain, 85 m. N.W. of the ruined city of Guatemala. In the surrounding district are lead mines

and the ruins of an ancient Indian town. Pop. of capital, 14,178.

Huelva. Maritime prov. of S.W. Spain. It is bounded on the N. by Badajoz, S. by the Atlantic, E. by Seville, and W. by Portugal. The surface is mountainous, and is traversed by the Odiel, Tinto, and other rivers, while it shares with Seville the marshlands (Las Marismas) of the Guadalquivir delta. Valuable timber and chestnut trees are grown, and oil, wine, fruit, cork, etc., produced. Its chief wealth is in the famous copper mines of Rio Tinto and Tharsis. There are numerous mineral springs. Area, 3,906 sq. m. Pop. (1950) 368,013.

Huelva. A town and port of Spain. The capital of the prov. of Huelva. It is the ancient Onuba. Near the junction of the rivers Odiel and Tinto, 9 m. N. of the Gulf of Cadiz, it has a good harbour and is the port for the Rio Tinto and Tharsis copper mines. In addition to copper, iron, manganese, and quicksilver, it exports wine, fish, grapes, olives, cereals, and cork. Fishing and plaiting of esparto grass are leading occupations. Founded by the Carthaginians and colonised by the Romans, Huelva is still supplied with water by a Roman aqueduct. It is a winter health resort and a bathing place. Its old Moorish mosque is now the church of San Pedro. Pop. (1950) 63,648. *See* Palos de la Frontera.

Huércal Overa. Town of Spain, in the prov. of Almería, near the river Almanzora, on the Lorca-Baza rly., 43 m. N.E. of the town of Almería. Its industries include the manufacture of linen and soap. There are small lead mines in the vicinity. Pop. (1950) 13,968.

Huerta, VICTORIANO (1854-1916). Mexican soldier. Of humble birth, he entered the army as a boy and had an uneventful military career until 1902, when, having suppressed an Indian revolt in Yucatan, he was promoted brigadier-general. He served Porfirio



Victoriano Huerta,
Mexican soldier

Diaz faithfully, and retained his military power under Madero. His campaign against Orozco in Chihuahua, 1912, brought his promotion to general, and in 1913, after commanding the government troops against Felix Diaz, he suddenly deserted Madero, who was assassinated, and was himself

elected provisional president. But popular feeling was against him, and in 1914 he resigned. He went into exile and died Jan. 10, 1916.

Huesca. Frontier prov. of N. Spain. It is bounded on the N. by France, on the E. by Lerida, and on the W. and S. by Saragossa. It is drained by tributaries of the Ebro, and its heights are covered with dense forests of pine, fir, and oak. In the valleys wine, fruit, and cereals, mulberry trees (for silk-worms) are produced. Area, 5,849 sq. m. Pop. (1950) 236,232.

Huesca. City of Spain, capital of the prov. of the same name. On the right bank of the river Isuela, 45 m. by rly. N.E. of Saragossa, it is built on a hill and enclosed by a double row of dilapidated walls, and has narrow and tortuous streets. There are a fine 15th-century Gothic cathedral, noted for its beautiful altarpiece, the old palace of the kings of Aragon, an episcopal palace, ancient churches, philanthropic and scholastic institutions, and a museum. Huesca University, founded in 1354, was united in 1845 with that of Saragossa. The trade of the city is connected with wine and agricultural produce. As the Roman Osca it was already important at the time of Sertorius (q.v.), who founded here his school in 77 B.C. and here was murdered. Under the Moors Huesca was a stronghold, taken in 1096 by Pedro I of Aragon, who made it his capital. Pop. (1950) 21,332.

Huet, PIERRE DANIEL (1630-1721). French scholar and ecclesiastic. Born at Caen, Feb. 8, 1630, he was educated there by the Jesuits, and as a young man travelled widely in Holland and Scandinavia. In Paris he became known as a scholar and theological controversialist; his interests included chemistry, anatomy, painting, and romances. For a time he acted with Bossuet as tutor to the dauphin. Ordained priest in 1676, he became bishop of Soissons, 1685, and of Avranches, 1689, and abbot of Fontenay, 1699. But from 1711 until his death, Jan. 26, 1721, he engaged in literary work at a Jesuit establishment in Paris. Among Huet's works were the editing, for his pupil, of the famous Delphin edition of the classics; an



Pierre D. Huet,
French scholar
From a print

edition of Origen, 1668; *Demonstratio Evangelica*, 1679; a work on the history of Cartesian philosophy, 1692; and a study of the origins of romances.

Hufuf. *See* Hofuf.

Hügel, FRIEDRICH, BARON VON (1852-1925). British Biblical critic. Born at Florence, he was the eldest son of Baron Karl von Hügel, Austrian botanist and diplomatist, and of the daughter of General Farquharson. He settled in England in 1871 and became naturalised. As a result of typhus the same year, he became handicapped by deafness, and for 15 years was unable to undertake any sustained mental activity. His eventual studies in Biblical criticism commanded wide respect. His works include *The Mystical Element in Religion*, 2 vols., 1908-9; *Eternal Life*, 1912-13. He died Jan. 27, 1925. *Conrall Life*, M. de la Bedoyère, 1951.

Huggins, SIR GODFREY. *See* Malvern, Viscount.

Huggins, SIR WILLIAM (1824-1910). British astronomer. Born Feb. 7, 1824, he early took an



Sir William Huggins,
British astronomer

interest in astronomy and erected a private observatory at Tulse Hill, London, where he made a study of Mars, Jupiter, and Saturn. Taking up spectrum analysis he laid the foundation of astrophysics. He first showed that one of the constituents of galactic nebulae was hydrogen, and formulated the theory that they were not star clusters, but masses of glowing gas. Huggins was a pioneer in spectroscopic photography, and with the aid of the dry plate revealed celestial objects otherwise invisible. He invented a method of studying the solar prominences, and showed the presence of calcium in them. President of the Royal Astronomical Society, 1876-78, of the British Association, 1891, and of the Royal Society, 1900-05, he received many honours from scientific bodies. He received the O.M. in 1902, and died May 10, 1910.

Hugh (c. 1135-1200). English saint, known as Hugh of Lincoln, or Hugh of Avalon. Born at Avalon, Burgundy, he became a monk at the Grande Chartreuse, where after a time he was made procurator. About 1164 he was made by Henry II prior of Witham, a new Car-

thusian house in Somerset, and in 1186 bishop of Lincoln. He did much to reform the clergy in his diocese, while he was equally ready to stand up to the king when the rights of his office were assailed, as when in 1197 he refused to supply Richard I with knights for service abroad. He died in London, Nov. 16, 1200, and his festival is kept on Nov. 17. He was canonised in 1220. A swan always figures as the companion of the saint, the story being that he kept a pet swan. (*Consult* Lives, R. M. Woolley, 1927; J. Clayton, 1931.)

Another Hugh, called Hugh of Wells, that city being his birthplace, became bishop of Lincoln in 1209, remaining there until his death, Feb. 7, 1235.

Hugh. Boy of Lincoln, England. He was found dead, Aug. 28, 1255, in a well belonging to a Jew named Copin. He was about 10 years old. It was believed that the Jew had scourged and crucified the boy, and the result was an outbreak of violence against the Jews. The story was popular in medieval England. A similar tale, set in Asia, is the subject of Chaucer's *Prioress's Tale*.

Hughenden. Village of Bucks., England, 1½ m. N.E. of High Wycombe in the Chilterns. At Hughenden Manor the earl of Beaconsfield (*q.v.*) lived from 1848; it was given to the National Trust, 1949 and opened as the Disraeli museum. In its noble park is the parish church, containing Queen Victoria's memorial to the statesman, who was buried outside the E. window of what is known as the De Montfort chapel, notable for its Tudor monuments. The church was rebuilt, 1874-75. To the N.W. is Bradenham, the Hurstley of Beaconsfield's last novel, where he lived in his youth.

Hughenden. Town of Queensland, Australia. It stands on the Flinders River, 236 m. inland by rly. S.W. from Townsville. Agriculture is possible only by irrigation from artesian bores. The town serves the cattle and sheep rearing district W. of the Great Dividing Range. Pop. 1,875.

Hughes, ARTHUR (1832-1915). British painter. He was born in London, and studied at the R.A. schools. Beginning to exhibit at the R.A. in 1854, he became associated with the pre-Raphaelite movement, and took part with Rossetti and his companions in the decoration with frescoes of the Oxford Union, 1858. He had already produced his *Ophelia*, *Eve of S. Agnes*, and *April Love*,

graceful and tender subject pictures in oils; but his reputation rests mainly on his water-colour work, and more especially on his black-and-white illustrations, *e.g.* to Tom Brown's *Schooldays*, 1869, and drawings for *Good Words*. He died Dec. 22, 1915.

Hughes, CHARLES EVANS (1862-1948). American politician and jurist. Born in Glens Falls, New York, April 11, 1862, son of a Baptist minister from Wales, he studied at Colgate and Brown universities, and took a degree in law at Columbia in 1884. He began practising in New York. During 1891-95 he occupied chairs in law at Cornell university, was legal adviser to various commercial undertakings, and in 1906 was employed by the attorney-general in the coal investigation. Ruthless exposure of insurance scandals won him the governorship of New York, 1907-10. Then he became a judge of the supreme court. In the presidential election of 1916 Hughes was the Republican selected to oppose Wilson, but was beaten by 23 electoral votes. During 1921-25 he was secretary of state. Judge at the permanent court of international arbitration at The Hague, 1928, he went back to the U.S. supreme court as chief justice, 1930-41. He died Aug. 28, 1948.

Hughes, DAVID EDWARD (1831-1900). Anglo-American inventor. Born in London, May 16, 1831, he went to America when a child, and in 1850 became professor of music at Bardstown College, Ky. In 1855 Hughes patented the printing telegraph which bears his name; and the companies formed to work this instrument were the nucleus of the Western Union Telegraph Co.

The Hughes system was adopted in France in 1861; in England and Italy in 1862; and in most other European countries between 1864 and 1876. In 1878 Hughes communicated to the Royal Society his invention of the microphone (*q.v.*), and next year that of the induction balance. In 1881 he was elected president of the Institution of Electrical Engineers. He died Jan. 22, 1900. *See* Telegraph.

Hughes, HUGH PRICE (1847-1902). Welsh preacher. He was born at Carmarthen, Feb. 8, 1847, the son of a doctor. He was intended for the law, but decided to enter the Wesleyan ministry, for which he was trained at Richmond theological college; he also studied at London university. He was successful as an ordinary minister, in Dover, Brighton, and

Oxford, while he became known to a wider public as superintendent of the wealthy London circuit of Brixton Hill. In 1887 he started the West London Mission, attracting large audiences to his services at S. James's Hall, which were intended for those outside the ordinary churches. In 1898 he was president of the Wesleyan Conference. Hughes edited *The Methodist Times*, which he founded in 1885, until his death from overwork, Nov. 17, 1902.

A great believer in unity among nonconformists, yet not without a liking for ceremonial, he was president of the Free Church Council, in the inception of which he took a prominent part. *Consult* Life, D. P. Hughes, 1904.

Hughes, RICHARD ARTHUR WARREN (b. 1900). A Welsh author. Educated at Charterhouse



Richard Hughes,
Welsh author

and Oriel College, Oxford, he saw his first play, *The Sisters' Tragedy*, produced in London in 1922, and *A Comedy of Good and Evil* in 1925. These two, with *Danger*, and *The Man Born to be Hanged*, were published together in 1924. *A High Wind in Jamaica*, an unusual story of children and pirates, appeared in 1929; *In Hazard*, the story of a ship in a typhoon, in 1938. Until 1936 vice-chairman of the Welsh National Theatre, Hughes claimed that *Danger* was the world's first radio play.

Hughes, SIR SAMUEL (1853-1921). Canadian politician. Born at Darlington, Ont., Jan. 8, 1853, he was educated at Toronto university, becoming a school teacher and later a journalist. In 1892 he entered the dominion parliament as Conservative member for Ontario, and in 1897 made a tour of the British Empire to advocate closer imperial defence. Minister of defence in the Borden government, 1911-14, he organized the Canadian forces at the outbreak of the First Great War and himself came to Europe. In Nov., 1916, he resigned from the cabinet owing to differences with his colleagues, but retained his seat in parliament. Knighted in 1915, he died Aug. 24, 1921.

Hughes, SPENCER LEIGH (1858-1920). An English journalist and politician. He was born at Trowbridge, April 21, 1858, went to

Woodhouse Grove School, near Leeds, and worked for the engineering firm of Ransomes, Ipswich. He joined *The Star* in 1891, and was lobby and gallery representative of *The Morning Leader*, in which he wrote the *Sub Rosa* column, continued for some time in *The Daily News* after its amalgamation with *The Morning Leader*, 1912. Hughes sat as Liberal M.P. for Stockport from Jan., 1910, until his death, Feb. 22, 1920.

Hughes, THOMAS (1822-96). A British author. Born at Uffington, Berks, Oct. 20, 1822, he was the



Thomas Hughes,
British author

son of John Hughes, editor of *The Boscobel Tracts*. Educated at Rugby under Arnold, he went to Oriel College, Oxford. In 1848 he became a barrister and in 1869 was made a Q.C. He entered parliament as Liberal M.P. for Lambeth in 1865, and sat for Frome 1868-74. In 1882 he was made a county court judge, his circuit being around Chester. Died at Brighton, March 22, 1896.

Hughes is famous for *Tom Brown's Schooldays* (q.v.), published 1857, a story of life at Rugby in the author's time. Its vividness and geniality set for school stories a standard no other writer has surpassed. Hughes was a Christian Socialist and an advocate of greater liberty and comfort for the working classes. He succeeded his friend F. D. Maurice as principal of the Working Men's College, London; another close friend was Kingsley. His other books include *The Scouring of the White Horse*, 1858; *Tom Brown at Oxford*, 1861.

Hughes, WILLIAM MORRIS (1864-1952). Australian statesman. A Welshman, born Sept. 25, 1864, the son of a carpenter, he was educated at Llandudno grammar school. In 1884 he went to Australia, where he spent some time as a sheep-drover and in other outdoor occupations in Queensland and New S. Wales, before settling in Sydney in 1890. During a great strike among the waterside workers he organized the wharf labourers of Sydney into a powerful union, of which he became general secretary. In 1894 Hughes was returned as Labour M.P. to the N.S.W. legislature and remained therein until the formation of the Commonwealth in 1901.

In that year Hughes was elected Labour member for W. Sydney. In the first labour government of Australia, 1904, he became minister for external affairs. Having served with various governments as attorney-general, in Oct., 1915, he became prime minister in succession to Andrew Fisher, whose chief lieutenant he had long been, retaining also his legal post. In 1915 and 1916 he visited England, and in 1918 attended the peace conference in Paris. Hughes continued in power until Feb. 2, 1923. From 1919 he was an English K.C. He entered the cabinet again as vice-president of the executive council under Lyons in 1934; held several offices in the coalition government; and became deputy leader of the opposition in 1941, when he was made C.H. Some of his speeches and writings were collected as *The Case for Labour*.

Hugo, VICTOR MARIE (1802-85). French poet, playwright, and author, born at Besançon, Feb. 26, 1802. His father's family came from Lorraine; his mother was of Breton stock. The father became an army general and, having attached himself to Joseph Bonaparte, took his family when he accompanied that monarch to Madrid, of which city he was made governor. Here Victor attended the college of nobles, where the prevailing aristocratic environment was to have a profound result in his later demagogic tendencies.

Under the Bourbons he lived with his mother in Paris, where, at the Pension Cordier, he received his only regular education. After her death in 1821 he lived in

penury. In 1816 he had begun to write, boasting "I wish to be Chateaubriand or nothing." Volumes of verse appeared in rapid succession: *Odes et Poésies Diverses*, 1822; *Nouvelles Odes*, 1824; *Odes et Ballades*, 1826; and his first stories, *Han d'Islande*, 1823, and *Bug-Jargal*, 1826. Written to please the court, these works were classical in form and royalist in sentiment. Their author received a pension of 1,000 francs from Louis XVIII, and in 1825 was created chevalier of the legion of honour.

Leader of French Romanticism

His sentiments became increasingly republican, e.g. in the dramas *Cromwell*, 1827 (its preface was a "romantic" manifesto), *Marion Delorme*, 1820, and *Hernani*, 1830. This last established his claim to be the high priest of French romanticism, a position he occupied for some 50 years as he poured out plays, novels, and poems. Hugo considered himself one of the leaders of humanity. He was intensely personal in his writings. *Le Dernier Jour d'un Condamné*, 1829, and much of his epic novel *Les Misérables* (q.v.) prove him to have been sincerely humanitarian.

The popular medieval romance *Notre Dame de Paris*, and the brilliant verses, *Feuilles d'Automne*, appeared in 1831; *Les Chants du Crépuscule*, 1835; *Les Voix Intérieures*, 1837; the drama *Ruy Blas*, 1838. At the height of his powers, Hugo in 1841 secured election to the Academy. The following year appeared *Les Burgraves*, his last acted play.

Created a peer by Louis Philippe in 1845, Hugo entered the political arena. The revolution of 1848 suppressed the house of peers, but he was elected to the new assembly under the Second Republic. Events made the poet-politician the symbol of progressive republicanism. The *coup d'état* of Napoleon III in 1851 deprived him of his position and he escaped to Brussels; his account of the affair, *L'Histoire d'un Crime*, was published in 1877. In 1852 he went to Jersey, where the *Journal de l'Exil* was begun, and *Les Châtiments*, invective in verse, completed. Expelled in 1856, he went to Guernsey. The success of *Les Contemplations* enabled him to purchase Hauteville House, henceforth his home. Famous works belong to this period, e.g. the first series of *La Légende des Siècles*; *Les Chansons des Rues et des Bois*;



Victor Hugo.

From the painting by Bonnat

Les Travailleurs de la Mer, Les Misérables, and L'Homme qui Rit. But this period of exile was unhappy. Deserted by his family, Hugo found himself in a backwater, though Juliette Drouet, an actress with whom he had long ago formed a liaison, remained faithful to him until her death in 1883.

After the Franco-Prussian War, Hugo returned in triumph to Paris. Later works include L'Année Terrible, 1872, which recorded the tragic events of the Paris siege, 1870-71. Quatre-Vingt-Treize, his last novel, appeared in 1874. Elected senator in 1878, he published Actes et Paroles in 3 volumes. His last years brought Les Quatre Vents de l'Esprit, and a drama, Torquemada. He died May 22, 1885, and was buried in the Panthéon.

Of Hugo's dozen plays, Hernani, Ruy Blas, Marion Delorme, and Le Roi S'Amuse are still remembered; of his novels, Notre Dame de Paris, Les Misérables, and Les Travailleurs de la Mer have a permanent place in literature. For energy and fertility he is not easily paralleled among writers. Inevitably much of his writing lacks depth and creative force. But he occupies an exalted position as one of the finest lyric poets, and the French agree that in this sphere principally he still merits the reputation he achieved during his career.

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Huguenots. Name given to the French Protestants, who adopted the Calvinistic form of the reformed religion. As in Scotland, the antagonism between the crown and the nobles, coupled with the monarchy's adherence to the R.C. faith, led many nobles to place themselves at the head of the Reformation movement. The Huguenots multiplied also among the humbler classes, especially in the industrial towns, while most of the north, and especially Paris, remained fervently Catholic. Under Francis I and Henry II, heresy was persecuted, but the nobles were too strong to be suppressed. In the reign of Charles IX there was a series of wars of religion. In spite of the

Massacre of St. Bartholomew the Huguenots were not crushed, and on the death of Henry III their leader made good the claim to the crown as Henry IV, but only by professing himself a Catholic.

By the Edict of Nantes, 1598, however, freedom of conscience was secured to the Huguenots, together with peculiar privileges in a number of centres. During the minority of Louis XIII there was some revival of persecution. When Richelieu came into power, 1620, he pursued Henry IV's policy of toleration, but the Huguenot nobles made religion a pretext for opposition to the growing power of the crown and the restriction of their own independence. Huguenot risings were put down, but the Huguenots were still not deprived of reasonable rights or privileges.

Throughout the reign of Louis XIII (d. 1643) they were active as a political faction rather than as a religious body. Louis XIV, however, after twenty years of personal rule, reverted, under the influence of Madame de Maintenon, to the policy of persecuting heresy; the Huguenots were subjected to the horrors of the *dragonnades* (q.v.), and in 1685 the Edict of Nantes was revoked. The result, in spite of the severest measures, was the flight of vast numbers of the best of France's industrial population, who took refuge in England, Holland, Brandenburg, and elsewhere. See France: History; Protestantism; Reformation; St. Bartholomew, Massacre of.

Huia (*Heteralocha acutirostris*). Bird of the crow family found in the forests of New Zealand, where it nests in hollow trees. The plumage is a glossy, greenish black, the tail tipped with white, and the large rounded wattles are orange-red. The remarkable feature of this bird is that the ivory-coloured beak of the male is short, straight and stout, while that of the female is long, curved, and slender. The birds work in pairs for their favourite food, the grub of a timber-boring beetle, the differing beaks enabling the birds to reach the grubs in decayed or hard woods. The huia is specially protected by the New Zealand government.

Huichols (healers). American-Indian tribe, some 3,000 in number, of Piman stock in the mountains of Jalisco, Mexico. Mingled with their primitive customs are Aztec and Christian elements. Their ceremonial life is exacting, there being 18 god-houses and several sacred caves.

Huila. Department of Central Colombia, S. America. Between the Central and S.E. Cordilleras, it is watered by the Magdalena river. Cattle are reared. The principal products are cacao, rice, sugar, coffee, and tobacco. The capital is Neiva (q.v.). There are remains of ancient civilization. Area 7,996 sq. m. Pop. (1951) 293,692.

The vapour-emitting volcano Huila is in the Colombian Andes, about 60 m. N.E. of Popayán.

Huitzilopochtli. Tribal war-and hunting-god of the Aztecs, regarded by the Aztec warrior-knights as their most important god. He was also the sun, born anew each day. His temple in Tenochtitlan, now Mexico City, was set alongside the temple of Tlaloc, the rain god, on the largest pyramid, and wholesale human sacrifices were offered on the sacrificial stone before them. His name means humming-bird sorcerer, and he wears a dress of humming-bird feathers and carries spear-thrower, spears, and a shield.

Hulaku Khan (d. 1265). Mongol king. Grandson of Jenghiz Khan, in 1253 he was appointed by his brother, Mangu Khan, governor of the W. portion of the Mongol empire, which included Persia, Georgia, Armenia, and the greater part of Asia Minor. Putting an end to the Assassin dynasty in 1255, he advanced on Bagdad and deposed the caliph in 1258, imposing his rule on Syria and Mesopotamia. In Persia he founded the Ilkhan dynasty at Azerbaijan and, on the death of his brother, proclaimed his own independence. See Mongol.

Hulbert, Jack (b. 1892). British comedian. Born April 24, 1892, and educated at Westminster and Caius College, Cambridge, he made his mark in university revues. One of these being produced at the Queen's Theatre, London, in 1913, Hulbert caught the eye of Robert Courtneidge, and was given a part in The Pearl Girl. Thence, except for a period of army service, he appeared with uninterrupted success in musical shows until 1931, including Clowns in Clover, 1927, in which he played opposite his wife Cicely Courtneidge. He made a feature of acrobatic and comedy dancing. In films, 1931-38, he appeared in Sunshine Susie and The Ghost Train, and was the star of Jack's the Boy, Bulldog Jack, etc. He returned to the West End stage in Under Your Hat, 1938; Something in the Air, 1943; Her Excellency, 1949, etc.

Claude Noel Hulbert (b. 1900) was a comedian who, in contrast to

Jack's breezy elegance, obtained his laughs from a diffident, apologetic manner, and was perhaps most successful as a broadcaster. Born Dec. 25, 1900, he was educated at King's College, Chatham, and Caius College, Cambridge, and made his London debut in Fantasia at the Queen's Theatre, 1921. He played in musical shows until 1930, specialising in comedy dancing, and then concentrated on film and radio work. He married the actress Enid Trevor. The Hulbert family—Jack, Cicely, Claude, and Enid—were long a popular B.B.C. feature.

Hull. River of Yorkshire (East Riding), England. It rises on the wolds near Great Driffield, and follows a winding, but generally southerly, course of 23 m., discharging into the Humber after passing through the city of Kingston-upon-Hull, better known as Hull (*v.i.*).

Hull. City, seaport, co. bor. of the E. Riding of Yorkshire, England; also co. of itself. Properly called Kingston-upon-Hull, it stands where the river Hull falls into the Humber, 20 m. from the North Sea and 175 m. N. of London. In the N.E. rly. region, it has bus and trolley bus services and a ferry across the Humber to New Holland.

The church of Holy Trinity, partly 13th century, has a Perpendicular nave and a massive central tower; the city hall and exchange are modern buildings in the Italian style. Other buildings are the Guildhall, Law Courts, Corn Exchange, Chamber of Commerce, and Custom House. Hymer's College is a public school, and there are an old grammar school, technical colleges, and a school of art; Wilberforce Museum occupies the house in which the emancipator of slaves was born. The city has an art gallery and two museums. The Charterhouse was founded in 1384, and Trinity House, a seamen's home, is another old foundation. There are three parks and a botanical garden. Beverley racecourse is in the vicinity. The old city lies between the modern docks and the river Hull. Pop. (1951) 299,068.

The harbour lies along the river Hull. Around it and along the N. side of the Humber are modern docks, belonging to British Railways, covering about 200

acres. Connected with them are extensive timber yards. King George V dock, the newest, is the largest on the E. coast of England outside London. The headquarters of the Ellerman-Wilson shipping line, Hull is the premier fishing port of the U.K. and the largest centre of seed crushing and oil extracting in the world. It has an important flour milling industry, and manufactures chemicals, cement, paper, paint, soap, starch, shoes, mill machinery, rope, and fish- and vegetable-oil products.

The city is administered by a lord mayor and corporation. The port is administered in conjunction with Goole. Hull, represented in parliament, at least from 1301, forms three bor. constituencies: Kingston-upon-Hull North, Kingston-upon-Hull East, Kingston-upon-Hull West. York diocese has a suffragan bishop for Hull.

Originally known as Wyke-upon-Hull, it stood on land belonging to a religious order, but Edward I bought it and changed its name to Kingston. It received its first charter from him in 1299. Walls were built, and the inhabitants were granted privileges, among them the right to choose a mayor and to be a county with a sheriff. As the volume of shipping increased, accommodation was provided along the river Hull. At the opening of the Civil War the Hothams held the town for parliament, and it was besieged in 1643 and 1644.

Hull's modern prosperity began with the industrial revolution. The first modern dock was constructed in 1774, and in the 19th century others were built and enlarged. In 1888 the town became a co. bor.

Hull was a target for German aircraft in the First Great War, and in the Second they attacked it heavily and repeatedly. Be-

tween Sept., 1939, and March, 1945, it suffered 82 air raids, in which 83,000 out of its 92,660 houses were destroyed or damaged, and 120,000 people rendered homeless. The killed and missing numbered 1,302; those seriously injured, 1,141. The city centre required almost complete rebuilding.

Hull's University College, opened in 1928, was granted the status of a university in 1954.

Hull. City of Quebec, Canada. It stands on the Ottawa river, just where the Gatineau falls into it, and opposite the city of Ottawa. Three bridges connect the two. Hull lies 119 m. W. of Montreal, and is served by the C.P.R., while there is an electric rly. across to Ottawa and to Aylmer. The city is the centre of the lumber industry, and its industries include sawmilling and the manufacture of wooden goods, such as furniture and matches; also paper, cement, biscuits, bricks, etc. It is the capital of Ottawa county. Hull was devastated by a fire in 1900. Because of its position the spot was a stopping place for Indians and traders. It was settled soon after 1800, and became a city in 1875. Pop. (1956) 49,243.

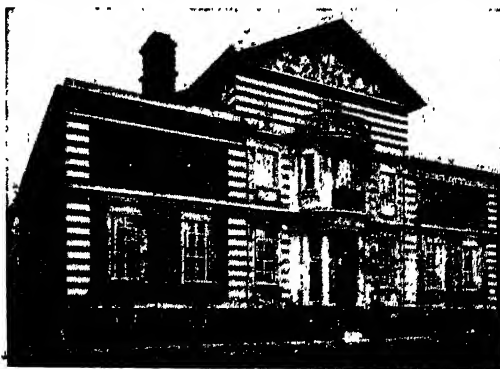
Hull, CORDELL (1871-1955). American statesman. Born in a log cabin in Tennessee, Oct. 2, 1871, and educated at Columbia university law school, he was a barrister at 20 and a circuit judge at 30. Democrat member of congress in 1907, except for the period 1921-23 he sat continually until 1931, when he



Cordell Hull,
U.S.A. statesman

was elected to the senate. In 1933 he resigned to become secretary of state in F. D. Roosevelt's administration, an office he held until ill-health forced him to resign in 1944.

Hull was chairman of an American delegation to the London economic conference in 1933, and headed



Hull, Yorks. Building housing the School of Art in this city of the East Riding

another delegation to the inter-American conference for the maintenance of peace, at Buenos Aires in 1936. With Roosevelt he inaugurated the "good neighbour" policy towards S. American states. Opposed to tariffs, he was an expert on taxation, and wrote the first American federal income-tax law. During the Second Great War he was criticised for his attitude towards France after the setting up of the Pétain regime, though events appeared to justify his policy when Darlan supported the Allies in N. Africa. Hull accompanied Roosevelt to the Quebec conference and took part in the foreign ministers' conference in Moscow. A delegate to the San Francisco conference in 1945, he was awarded the Nobel peace prize for that year. He published *Memoirs*, 2 vols., 1948, and died at Washington, July 23, 1955.

Hull, HENRY CHARLES (1860–1932). South African politician. Born, Nov. 21, 1860, at Caledon, he became a solicitor. For his share in the Jameson Raid he was sentenced in 1896 to two years' imprisonment and a fine of £2,000. In the S. African War he served in the Light Horse. An associate of Botha, he became treasurer of the Transvaal, and in 1910, when the Union of S. Africa was formed, he entered its cabinet as minister of finance. In 1911 dissensions broke out, and in 1912 Hull resigned on a disagreement over railway policy. He died on Oct. 9, 1932.

Hull, WILLIAM (1753–1825). An American soldier. Born at Derby, Conn., June 24, 1753, he became a lawyer in 1775. On the outbreak of the War of Independence he became a soldier, and rose to be lieut.-colonel. When the U.S.A. secured its independence, he became head of the militia of Massachusetts, and a member of the senate. Later he was governor of the territory of Michigan. When, in 1812, war broke out between Great Britain and the U.S.A., Hull invaded Canada in command of an army, but soon fell back, and, shut up in Detroit, surrendered to the British. He was tried by court-martial and sentenced to death, but the sentence was not carried out. Hull died Nov. 29, 1825.



William Hull,
American soldier

Hullah, JOHN PYKE (1812–84). An English composer. Born at Worcester, June 27, 1812, he studied at the Royal Academy of Music, and in 1836 produced his first large work, an operetta, *The Village Coquettes*, to a libretto by Dickens. Several of his ballad tunes are remembered, e.g. *The Sands of Dee*, *The Three Fishers*. Professor of vocal music at King's College, London, 1844–74, he upheld the system of a fixed Do against the tonic sol-fa. He died Feb. 21, 1884.

Hull House. The pioneer American social settlement. It was founded in Chicago in 1889 by Jane Addams (*q.v.*). She acquired an old country mansion, once owned by Charles J. Hull, in the centre of a district packed with immigrant victims of the sweating system. Assailed in the Chicago press as a breeding place of anarchists, it lived down this accusation and became generally recognized as a model example of co-operation in social advancement.

Hulse, JOHN (1708–90). English clergyman. Born at Middlewich, Cheshire, March 15, 1708, he was educated at S. John's College, Cambridge. After working for some years as a clergyman, he in 1753 inherited his father's estates in Cheshire and retired into private life. At his death, Dec. 14, 1790, he left his property to the university of Cambridge to found two divinity scholarships at S. John's of £30 a year each; to provide a prize—now called the Hulsean prize—for a dissertation on Christian evidences; to endow a new office of Christian advocate—now the Hulsean professor of divinity; and to endow a lectureship (*v.i.*).

Hulsean Lectures. Lectures delivered at Cambridge university in connexion with a bequest of the Rev. John Hulse (*v.s.*). He left to the university some land in Cheshire, which now produces about £1,200 a year. The fund provides for a preacher, a professor, a lecturer on some branch of Christian theology, and a prize, which is worth about £110. The first lecture was delivered by Christopher Benson (1789–1868) in 1820.

Hulton, SIR EDWARD (1869–1925). A British newspaper proprietor. He became the head of Hulton & Co., Ltd., publishing a group of successful newspapers in Manchester, including the *Daily Dispatch*, *Sunday Chronicle*, and *Empire News* (now *Sunday Empire News*). He also founded two London papers, the *Daily Sketch* (now *Daily Graphic*), 1909

(London publication, 1911), and the *Illustrated Sunday Herald* (now *Sunday Graphic*), 1915; and from 1915 to 1923 held the controlling interest in the *Evening Standard*, London. The Manchester papers were the original basis of what was formed in 1924 as *Allied Newspapers, Ltd.*, and later became *Kemsley Newspapers*. Hulton, who was well known as a patron of the turf, was created a baronet in 1921, and died May 23, 1925. (See *Camrose*; *Kemsley*.)

His son, Edward George Warris (b. 1906), who in 1938 founded his own publishing company, was knighted in 1957.

Human Comedy, THE. See *Comédie Humaine*.

Humane Society, THE ROYAL. Society for rendering first aid in cases of drowning and for restoring life to the apparently drowned or dead. It was instituted in England in 1774 at the instance of Dr. William Hawes (1736–1808) and Dr. Thomas Cogan (1736–1818). The first life-saving depot was the Receiving House, built on the bank of the Serpentine in 1794 on a site given by George III; it was damaged by bomb blast in 1940.

The society makes awards of medals, testimonials, and sums



Royal Humane Society's medal,
awarded for gallantry in saving life

of money for gallantry in saving or attempting to save life from drowning and from asphyxiation in mines, wells, sewers, and similar places. In 1946, 506 persons were rewarded by the Society for saving or attempting to save 471 lives. It gives prizes for swimming to schools and training ships. In 1873 the Stanhope gold medal was instituted, to be awarded annually for the act of greatest gallantry during the preceding year. The offices are at Watergate House, York Buildings, London, W.C.2.

Humanised Milk. Cow's milk made, as far as possible, to resemble in composition human milk. Several processes are adopted by manufacturers, but all dilute cow's milk so as to reduce the proportion of protein, and add cream and sugar. See *Diet*; *Milk*.

Humanism. Name given to a phase of the intellectual movement marking the Renaissance (*q.v.*). The medieval outlook upon life, with its hard and fast rules of conduct, had stifled the moral and intellectual development of the individual. In revolt against scholasticism and clerical predominance, humanism looked for an ideal system of culture—the Ciceronian *humanitas*, whose name lingers in the Scottish school of humanity and the Oxford *literae humaniores*—and found it in the revival of classical learning. It embraces the period from Petrarch (1304–74) to Melancthon (1497–1560).

As used by modern philosophers, humanism is applied to almost any system of thought that places man and human affairs in its centre, disregarding, in particular, abstract and supernatural phenomena. Pragmatism or empiricism is one form of humanism; scientific humanism is another, perhaps more extreme. Humanist philosophers include such diverse personalities as John Dewey and Gilbert Murray, Paul Elmer More and Julian Huxley. See Philosophy; Pragmatism.

Humanitarianism. Term used in a general sense for people who seek the physical welfare of their fellows. The term has also been used in a more restricted sense. About the middle of the 18th century a school of thought arose which denied the divinity of Christ and virtually adopted the position of modern Unitarians, its followers being known as Humanitarians. Another sect was started by Pierre Leroux (1798–1871), who held that human nature was of itself capable of reaching perfection.

Human Rights, DECLARATION OF. International bill drawn up and adopted by the United

Nations, Dec. 10, 1948, after 2½ years of study by a U.N. commission under the chairmanship of Mrs. Eleanor Roosevelt. In 31 articles it stated the fundamental minimum rights of every human being. Human rights clauses were written into the peace treaties signed in 1947 between the Allies and Axis satellites; in April, 1949, the U.K. and the U.S.A. charged Bulgaria, Hungary, and Rumania with the violation of these clauses, and in 1950 announced their intention of bringing the matter before the international court of justice.

Humayun (1508–56). Mogul emperor. Coming to the throne of Delhi in 1530 as the son of Babar (*q.v.*), he was immediately plunged into war with the Afghans, and in 1540 was forced to retire to Persia. His campaign against the Afghan Sher Shah in 1555 was successful, and he was able to take possession once again of Delhi (*q.v.*). The following year he had a fatal fall in his palace. He was succeeded by his son Akbar (*q.v.*).

Humber. Estuary on the E. coast of England, formed by the rivers Ouse and Trent. Its length is 37 m., breadth from 1 m. to 8 m., and drainage area 9,300 sq. m. The entrance is partly enclosed on the N. by the Spurn Head peninsula. Grimsby is situated on the S. shore near the entrance, Hull about midway along the N. shore, and Goole at the head of the estuary.

In 1937 archaeologists dug up two primitive boats from the mud at North Ferriby, near Brough. Estimated to be 2,500 years old, the boats were 45 ft. long and 4 ft. wide; unlike other primitive craft, they were carvel-built, of oak framework covered with planking sewn with yew withies.

Humbert I OR UMBERTO I (1844–1900). King of Italy. Born at Turin, March 14, 1844,

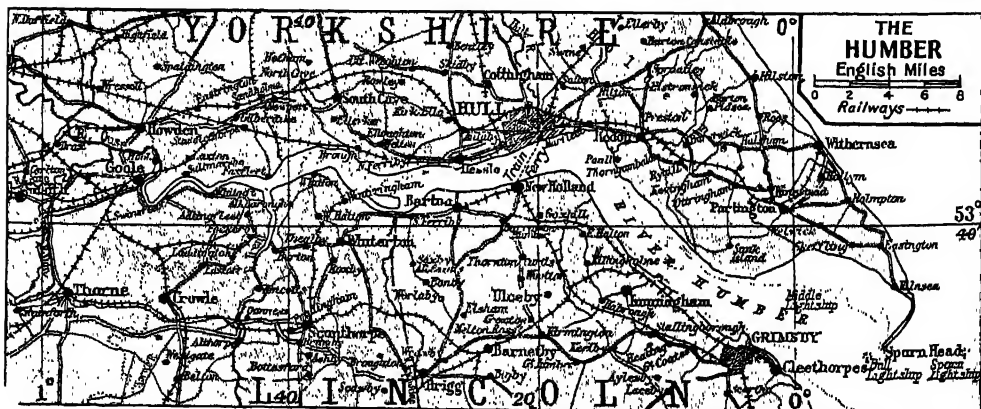


Humbert I,
King of Italy

he was the eldest son of Victor Emmanuel II and Maria Adelaide, arch-duchess of Austria. He commanded the 16th division at the battle of Custoza, 1866. In 1868 he married his cousin, Princess Margherita of Savoy (d. 1926). On Jan. 9, 1878, Humbert succeeded to the throne. The great popularity which he earned by bravery and deeds of kindness waned, and on July 29, 1900, he was assassinated at Monza by an anarchist, Bresci. His successor was his only son, Victor Emmanuel III (*q.v.*).

Humbert II OR UMBERTO II (b. 1904). Last king of Italy. Born Sept. 15, 1904, the son of Victor Emmanuel III, he was educated at the royal military academy, Turin. In 1930, as prince of Piedmont, he married Princess Marie José of Belgium. Ten years later he was in command of Italy's army of the Alps, with the rank of general. On June 5, 1944, he was designated lieutenant-general of the realm, taking over all royal powers. Following the abdication of Victor Emmanuel on May 9, 1946, he was proclaimed king; but, the referendum in June giving a majority for a republic, left for Portugal, June 13.

Humble Bee OR BUMBLE BEE (*Bombus*). Insects of the order Hymenoptera, with densely hairy bodies usually banded with white, yellow, or reddish orange. They are social in habit. In the tropics



Humber. Map of the estuary formed by the rivers Ouse and Trent on the east coast of England

they are chiefly confined to mountains; they are absent from the plains of India and from most of Africa, while only introduced species occur in Australia and New Zealand. In temperate regions the colonies perish in autumn, but some females hibernate and reappear in spring to found new societies.

Workers are the most abundant caste and are usually only clearly separable from the queens or females by their smaller size. The nests are made either below ground or on the surface among close herbage. The cells are of wax, rounded and in irregular groups, very unlike the comb of the hive bee. The honey is pleasant to taste. The tongue of a humble bee is much longer than that of a hive bee, enabling it to extract nectar from long tubular flowers such as clover, nasturtium, or foxglove.

In addition to the humble bees that form the genus *Bombus*, there are parasitic species (genus *Psithyrus*) that live in the nests and at the expense of the *Bombus* brood. *Psithyrus* produces no workers, its males and females being reared by the *Bombus* workers. Nineteen species of *Bombus* and six of *Psithyrus* occur in Great Britain. Consult *The Humble Bee*, 1912, F. W. L. Sladen.

Humble Petition and Advice. Second written constitution given to England during the Commonwealth, the Instrument of Government being the first. In 1657 the Instrument had proved a failure, the establishment of the major generals had caused much discontent, and the Commonwealth was in danger. In these circumstances parliament met and discussed the Humble Petition.

Cromwell was offered the position of king, and was authorised to call together a house of lords. He was allowed to name his successor, and given command of the army and navy. The petition was framed to prevent undesirable persons from sitting in parliament or on the council. Cromwell refused the title of king, and thus amended the petition was passed on March 25, 1657. A little later it was altered somewhat by the Additional Petition and Advice, the result being, as S. R. Gardiner says, "to enlarge the power of parliament and to diminish that of the council." See *Cromwell*, Oliver; *Instrument of Government*.

Humboldt. River of Nevada, U.S.A. Rising in the N.E. of the state, it flows 350 m. W. and S.W. to Humboldt lake, or sink, in

Churchill co. The river formerly overflowed into Carson lake, but its waters are now arrested by a dam. It is unnavigable, and its waters are salty. In its upper reaches and also in the lake district, near its former mouth, there are projects for irrigation works. The Humboldt cuts gorges in the N.-S. mountain ranges, and its valley provides the only E.-W. passage through the Nevada Mts. The Southern and Union Pacific rlys. follow the river along the route taken by many of the "Forty-Niners" on their way to the California goldfields.

Humboldt, FRIEDRICH HEINRICH ALEXANDER, BARON VON (1769-1859). German scientist.



Baron
von Humboldt,
German scientist
After Carl Begas

Born in Berlin, Sept. 14, 1769, of noble family, he studied science, and in 1790 travelled through France, the Netherlands, and England. In 1792 he was made assessor of mines. In 1799 he sailed with Bonpland (*q.v.*) to Venezuela, and made extensive explorations in the regions of the Orinoco and the Amazon. In 1802 he ascended Chimborazo to the height of 19,000 ft., travelling thence to Peru and on to Mexico, returning to Europe in 1804. Later he took up his residence in Paris, and published in great detail the results of his travels in 30 volumes. In 1827 he moved to Berlin, whence, at the invitation of the Tsar Nicholas, he made an expedition beyond the Ural and Altai mountains, 1829.

His great literary work, *Kosmos*, an encyclopedic account of the physical universe, which he began at 76, was published in four volumes between 1845 and 1858, and won him a world-wide reputation. It was a reconciliation of 18th century idealism with 19th century research. Humboldt suggested the igneous origin of rocks, made a study of terrestrial magnetism and of plant distribution, and left his mark on many branches of science. He died May 6, 1859.

Humboldt, KARL WILHELM VON (1767-1835). German scholar. Born at Potsdam, June 22, 1767, he was the elder brother of the above. He was educated at Berlin and Göttingen and entered the public service of Prussia, but spent much time travelling and in

study. In 1802 he was sent to Rome as minister, but he was soon at home again as minister of public instruction. He was employed in diplomatic work during the eventful



K. W. von Humboldt,
German scholar
After F. Krüger

years 1810-19, being minister at Vienna and taking part in conferences in Paris, London, Aix-la-Chapelle, and elsewhere. Thereafter he devoted himself to literature. He began with an essay on Goethe's *Hermann and Dorothea*. Other works were translations of the Greek and Latin poets. As a philologist Humboldt really made his name. He devoted special attention to the Basque language, and began a book on that of the Kawi of Java, the introduction to which is regarded as a landmark in the study of philology. Humboldt was one of the founders of Berlin university. He died April 8, 1835.

Humboldt Current. Ocean current called after Baron Friedrich von Humboldt (*q.v.*), who first charted its course. It flows from the Antarctic along the W. coast of S. America to Punta Parina, Peru, where it alters course to the open sea. The space between the coast and the current is filled by cold water rising from the depths of the ocean, so that the W. coast of tropical S. America is washed by water at an average temperature of 60° F. Consequently these coastal areas, are not tropical.

Hume, DAVID (1711-76). Scottish philosopher and historian. Born in Edinburgh, April 26, 1711, he was educated

at its university. Neither law nor business, which he successively essayed, proved congenial, and in 1734 he went to France to study philosophy with the Jesuits. In 1737



David Hume, Scot-
tish philosopher and
historian

appeared his first book, *A Treatise of Human Nature*, written from that standpoint of universal scepticism which was the basis of all Hume's philosophy. The book attracted little attention, but his *Essays*, *Moral*, *Social*, and *Political*, published in Edinburgh in 1741-42, were well received. After another period abroad as secretary to General

St. Clair, in which capacity he visited Vienna and Turin, he settled in Edinburgh in 1752 as librarian to the Advocates' Library. Meanwhile he had published *An Enquiry Concerning the Principles of Morals*, 1751, in which he propounds a philosophy with a definite utilitarian note, and *Political Discourses*, 1751, which foreshadowed the free trade ideas of Adam Smith.

In 1754 was published the first part of a *History of England*, other parts following in 1756, 1759, and 1762. Inverting the usual practice, Hume began with the Stuart period and worked backwards to Roman Britain. The work has many faults and many merits. Hume had a temperamental bias against all popular institutions, which tends to make him an apologist for the Stuart monarchy. But he was the first to stress the social and intellectual condition of the people as essential elements in historical narrative. The work was a great success, but owing to the author's prejudices and inaccuracies it is useless to the student. In 1757 appeared the *Four Dissertations*.

In 1763 Hume went again to France, as secretary to the British ambassador, and stayed there three years. On returning to England he held an under-secretaryship at the Foreign Office, then from 1769 was in Edinburgh, where he died Aug. 25, 1776.

Two contributions were made by Hume to philosophical study. His defence of naturalistic ethics has remained unsurpassed even by J. S. Mill, and his critical examination of the notion of causation has never been satisfactorily refuted. Hume began where Berkeley had left off. In effect, he eliminated substance from mind. Impressions, he said, were the only things of which we had knowledge; we never had knowledge of mind. From this it follows that we cannot transcend our own impressions. Cause and effect are just a customary sequence of events. We are denied any faculty of abstraction: real knowledge, as Hume admits quite frankly, is apparently impossible. Applying his principles to ethics, Hume maintained that what is good is what is generally desired. His conclusions are the logical extreme of the empirical school and are based on the atomic view of psychology in that the mind is considered more as a passive receptacle of impressions than as an active and creative force.

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Humeral (Lat. *humerus*, shoulder). Veil or scarf worn over the shoulders by R.C. clergy. A sub-deacon wears it when holding the paten at High Mass; a priest when he raises the monstrance to give benediction with the Blessed Sacrament; and priests and deacons when removing the Blessed Sacrament from one place to another or carrying it in procession.

Humerus (Lat.). In anatomy, the upper arm bone. The superior extremity consists of a rounded head which articulates with the glenoid cavity of the shoulder blade and two tuberosities to which are attached muscles springing from the shoulder blade. The shaft gives attachments to the pectoral muscles coming from the front of the chest, and muscles which cause movements of the elbow. The inferior extremity has a projection on each side known as the condyle, for the attachment of muscles, and a smooth rounded part which articulates with the bones of the forearm. See *Anatomy*; *Arm*; *Man*.

Humidity (Lat. *humidus*, moist). State of the air considered with reference to the water vapour it contains. Wherever air, not already saturated with moisture, and water are in contact with each other, particles of water, in the form of vapour, pass into the air. When the air contains as much water vapour as it will hold, it is said to be saturated. The temperature corresponding to saturation by a known moisture content is described as the dew point temperature above 32° F., and as the hoar-frost point below 32° F. The higher the temperature of the air, the more the water vapour that can be held by a given volume of air; thus when saturated air is cooled, some of the water vapour condenses into liquid.

The heavy rainfall of equatorial regions is accounted for by the high temperature of the vapour-laden winds which are cooled in their forced ascent in the Doldrums low-pressure belt of calms. The feeling of wetness or dryness in the air is no indication of the amount of water vapour the air contains, as the presence of a certain amount of water vapour in air whose temperature is 40° F. may cause saturation, whilst the same amount at 70° F. may not be sufficient to give even a feeling of dampness.

In figures, 2.86 grains of moisture would saturate a cubic foot of air at 40° F., but would constitute only 36 p.c. of saturation were this air heated to 70° F. It has been asserted that the air of the Sahara normally contains more water vapour per cubic metre than that in England on a wet winter day, but it is not apparent on account of the high temperature.

The term absolute humidity is given to the actual weight of water present in a cubic foot, or metre, of air. The ratio of the absolute humidity to the weight of vapour which might exist if the same volume of air were saturated is called the relative humidity. The latter may also be expressed by the ratio:

$$\frac{\text{actual vapour pressure}}{\text{saturation vapour pressure at air temperature.}}$$

The relative humidity of the atmosphere exerts an influence on comfort, and is of primary importance in many industries. All systems of air conditioning, as distinct from ventilation, necessarily incorporate equipment for the automatic control of atmospheric humidity. Air should be dry enough to take up freely by evaporation the moisture continuously given off by perspiration and exhalation. It must also be sufficiently moist to do so imperceptibly, to avoid undue cooling of the skin and dryness of lips and throat.

The desirable ratio between the degrees of dryness and moistness, the optimum relative humidity, may vary with temperature and velocity of air movement between 50 to 70 p.c. without appreciable discomfort. In the U.K. the geographical location and the moistness of the ambient air combine to render 65° F. and a 60 p.c. r.h. the most comfortable condition. In the U.S.A. a temperature of 70° F. and a 50 p.c. r.h. are preferred because of the lesser overall moistness of the atmosphere. In both countries a lower r.h. would be fit for special conditions, e.g. in an hotel kitchen.

Many industries, notably wool spinning and film manufacture, require an r.h. between 80 and 90 p.c., together with dry-bulb temperatures of 75° F. to 80° F. In the final stages of tobacco curing, 100 p.c. r.h. in a temperature over 100° F. is necessary. A Factory Act prohibits the artificial humidification of certain rooms in textile factories when the wet-bulb reading exceeds 72.5° F., or when the wet-bulb depression is



1. *Lophornis ornatus*, West Indies and Central America.
 2. *Lamprolaema rhami*, Mexico. 3. *Prymnacantha popelairii*, Costa Rica to Brazil. 4. *Steganura woodi* and, 5. *Cyanolestia gorgo*, Venezuela and Colombia. 6. *Chrysolampis mosquitus*, New Granada to Brazil; Trinidad. 7. *Heliotrix barroti*, Central America.
 8. *Selasphorus rufus*, Western U.S.A. to Alaska.
 9. *Sappho sparganura*, Peru, Bolivia, Chile, and Argentina. 10. *Topaza pella*, Guiana. 11. *Heliomaster furcifer*, S. Brazil, Paraguay, and Argentina. 12. *Aithya polytmus*, Jamaica. 13. *Heliangelus strophianus*, Ecuador. The drawings are about one-half life size.

HUMMING BIRDS : LIVING JEWELS OF THE WESTERN HEMISPHERE



1. Typical small house, with thatched roof and a stork's nest on the chimney. 2. Girls in national costume, which is also their "Sunday best," assembling for morning service at their village church. 3. Peasants,

at work in the fields. 4. Archbishop in pontificals. 5. Dance at a village fête. 6. Corner of a workman's home at Mézőkovésd. 7. Horseman of the plains. 8. Country handiwork at a street market in Budapest

HUNGARY: TYPES OF THE PEOPLE AND ASPECTS OF PEASANT LIFE

less than 2° F. Work must cease when the reading of the wet-bulb thermometer exceeds 80° F. See Hygrometer; Meteorology; Rain-fall.

J. W. Cowan

Humite. One of a group of minerals, comprising norbergite, chondrodite, humite, and clinohumite. They are all basic fluosilicates of magnesium; hydroxyl replaces part of the fluorine, and iron often takes the place of magnesium. These minerals commonly occur in Archaean metamorphosed dolomitic limestones. Common associated minerals include spinel, chrysolite, pyroxene, phlogopite, and magnetite.

Hummel, JOHANN NEPOMUK (1778-1837). Austrian musician, born at Pressburg, now Bratislava, Nov. 14, 1778. He learned the piano, and at the age of seven attracted the attention of Mozart, who installed him in his house as pupil. After touring Germany, Holland, and England, Hummel settled in Vienna, 1793, to study composition. He was Kapellmeister to Prince Esterhazy, 1804-11, and held similar posts in Stuttgart, 1816, and Weimar, from 1820. In 1833 he conducted German opera in London. As a pianist he ranked with Mozart and Beethoven, and he published a piano school which advocated new fingering methods; Czerny was among his pupils. Besides piano pieces, he wrote chamber music, songs, a mass, and two operas. He died Oct. 17, 1837.

Humming Bird. Large family of birds, Trochilidae. Mostly of small size, they are found chiefly in central and tropical S. America. They derive their name from the sound produced by the rapid vibration of their wings as they hover before a flower. There are about 500 known species, the smallest just over 2 ins. long and the largest 8½ ins. Usually the plumage is extremely brilliant and glistening. The effect is enhanced by the birds' crests, tufts, ruffs, and beards of feathers. Many have elongated and forked tails of elaborate character.

The sternum or breast-bone is highly developed and keeled to form an extensive base of attachment for the powerful muscles needed for the vibration of the wings. The beak is long and slender, and the long tongue is in the form of a double tube which can be extended to reach the bottom of deep flowers. The popular idea that humming birds live wholly on the nectar of flowers is erroneous, minute insects being

important in their diet. Zoologically they are more nearly related to the swifts than to any other family.

The small nest is constructed of moss, hair, and fine fibres, with an outer layer of leaves and lichens. It is placed on the slender branches of trees, its deep cup shape preventing the two eggs from being thrown out in a breeze. Some species are said to enlarge their nests as the young ones grow. Humming birds are not songsters, though most have call notes so high pitched and faint as to be almost inaudible.

The flight of some species consists of a series of erratic darts, varied by hovering and curious tumbling evolutions, made while the bird is catching insects in the air. The swiftness with which the bird darts about is such that the eye often fails to follow it. The birds live long in captivity only if most carefully kept with correct temperature, light, and diet. Some species have been found capable of resuscitation from complete coma induced by cold. It is thought that in nature they habitually survive in this state.

One of the most remarkable species is the racket-tailed humming bird, known only from the upper Amazon. It is extremely small, but is conspicuous for its jewelled crest and gorget and its wonderful tail. The second pair of tail feathers are wire-like and, after bending to form a loop, cross one another and end in purple expansions suggestive of a tennis racket. In the double-crested humming bird the general colour of the plumage is metallic green, and over the eyes are glittering tufts of purple, gold, and green. The throat is black and the under parts are pure white. It is found in a few places in Brazil.

The largest of the group, the great humming bird, is found in the Andes, and is about 8½ ins. long, with a wing spread of 5½ ins. It is not brilliant in colour, flies more deliberately than most other species, and expands and shuts its tail feathers fanwise when poised over a flower. See Bird; also colour plate facing p. 4360.

Humour. In literature and in general use, term applied so widely as to embrace all forms of the comical, funny, ludicrous, or diverting. Galen said that four humours, blood, choler, phlegm, and melancholy, lay at the base of the sanguine, bilious, phlegmatic, and melancholy dispositions of men, and that the perfect

man would have the four humours in equal proportion. The man of humour thus came to be one in whom any of these dispositions greatly preponderated over the others so as to give him a certain singularity. With a fitting prefatory adjective, the word is still thus applied.

Humour by itself, however, is always taken to indicate something with the elements of fun in it. With the 18th century humour began to be associated more especially with a new quality of tenderness, as exemplified in the writings of Addison, Steele, Goldsmith, Sterne, and others, and by the 19th century the use of the term had been extended to all manifestations of fun in literature and in action. Thackeray gave a high imprimatur to the wider comprehensiveness of the word by including in his survey of the English Humorists of the 18th century Jonathan Swift, whose qualities were rather those of satiric and sardonic wit than of humour.

Yet it is to Thackeray that we owe what are perhaps the best definitions of humour as exemplified in literature: "The humorous writer professes to awaken and direct your love, your pity, your kindness—your scorn for untruth, pretension, imposture—your tenderness for the weak, the poor, the oppressed, the unhappy"; and again, "A literary man of the humoristic turn is pretty sure to be of a philanthropic nature, to have a great sensibility, to be easily moved to pain or pleasure, keenly to appreciate the varieties of temper of people round about him, and sympathise in their laughter, love, amusement, tears—the best humour is that which is flavoured throughout with tenderness and kindness."

The term humour has in common use come to be applied to the work of all writers who seek to divert by means of raising smiles or laughter, whether by sympathetic understanding and presentation of idiosyncrasies, or by the cruder forms of ridicule and exaggeration. Humour is often confused with wit, but there are essential differences between them. As Leigh Hunt put it, "each is to be found in perfection apart from the other, yet their richest effect is produced by combination." See Wit.

Hump. Structure on the back of the camel, consisting of fatty tissue in which the animal can store nourishment which it consumes when short of food. The

hump probably does not play any significant part in enabling the animal to go without water. In the dromedary there is one hump; in the Bactrian camel there are two.

Hump, THE. Name given to the mt. barrier between Assam and China by airmen flying on the air supply route between those countries developed by the U.S. army during the Second Great War. When, in May, 1942, the Japanese overran Burma, thus closing the Burma Road to the Allies, it was decided to open two alternative lines of communication with China: the Ledo Road (*q.v.*) and an air route "over the Hump." U.S. engineers built large air bases in N. Assam—Chabua and Dinjan were two of many—as staging posts on a new direct air link with Yunnan. From small beginnings a greater volume of traffic eventually crossed the Himalayas by air than had used the Burma Road (20,000 tons a month in 1944, rising to 44,000 tons in Jan., 1945, compared with 18,000 tons). Technicians and warlike and medical stores were included in the loads, which were chiefly for the U.S. air forces stationed in China.

Hump-back Whale (*Megaptera nodosa*). Large cetacean found in most seas, and sometimes seen in summer off the coasts of Scotland and Ireland. It is black in colour, and attains a length of 50 ft. The back fin is mounted on a prominence, which gives the species its popular name. It is regularly hunted for its oil, which varies in amounts from 8 to 75 barrels per individual. *See* Whale.

Humperdinck, ENGELBERT (1854-1921). German composer. Born at Siegburg, Sept. 1, 1854, he studied music at Cologne and Munich. Visiting Italy, he met Wagner, whom he assisted to produce Parsifal at Baireuth. In 1887, after teaching at Barcelona, he returned to Cologne, and in 1889 became a teacher in the conservatoire of music at Frankfurt. He moved in 1900 to Berlin, where he was head of the Meister Schule. Humperdinck's fairy opera, *Hänsel and Gretel*, 1893, was the cause of his sudden leap to fame. He wrote incidental music to *The Miracle*, 1911. For a time music critic to the *Frankfurter Zeitung*, he died Sept. 27, 1921.



E. Humperdinck,
German composer

Humphrey. Masculine Christian name. Of Teutonic origin, it means support of peace, and was popular in France and England in the Middle Ages. The phrase "dinner with Duke Humphrey" refers to the duke of Gloucester (*q.v.*), a brother of Henry V.

Humphrey Clinker. Novel by Tobias Smollett, published in the year of his death, 1771, as *The Expedition of Humphrey Clinker*. The nominal hero is the illegitimate son of the man into whose service he enters as a hobbledoy of all work. Setting forth a sentimental journey through Britain, the book may well have been designed as a skit on the successful novels in letters of Richardson and the *Sentimental Journey* of Sterne. The most genially humorous of Smollett's works, it presents some ludicrous characters, and develops its story in a series of letters from a small group of correspondents. Tabitha Bramble, a forerunner of Mrs. Malaprop, and Winifred Jenkins, with her ridiculous misspellings, are notable.

Humphreys, SIR TRAVERS (1867-1956). British judge. Educated at Shrewsbury and Trinity

as a miniaturist; but in 1763 he returned to London. He painted miniatures with great success until 1772, when a fall from his horse temporarily disabled him. In 1773 he went to Rome and in 1785 to India, where he executed oil portraits, resuming miniature painting on his return to England three years later. He had become A.R.A. in 1779, and in 1791 was elected R.A. Failing sight compelled him to abandon miniature in his last years, but he had taken up portraiture in crayons. Humphry died March 9, 1810.

Humus. Gelatinous product of decay of vegetable and animal material on and near the ground surface. The mixture of organically derived humus with mineral matter of rock-decomposition constitutes soil. *Consult* Humus and the Farmer, F. Sykes, 1946.

Hunan. Province in central China. Covering 79,378 sq. m., it has 74 counties and two municipalities, with Changsha as its capital. Other cities include Changteh and Hengchow. The Canton-Hankow rly. runs through the province from N. to S.; the Hunan-Kwangsi rly. extends W. to Kweilin, and the Hunan-Kweichow line W. to Kweiyang. In addition to being the country's largest rice-producing area, Hunan yields many minerals, including wolfram and antimony. Other products are tea, tung oil, and linen. S. of the Yangtse is Tungting Lake, the largest in the country. Pop. (1953) 33,226,954.

During the Second Great War, in Sept., 1941, the Japanese launched an offensive southwards against Changsha, but were compelled to withdraw on Oct. 2. A fortnight later they captured Chenchow in S. Hunan, only to be driven out in Nov. In the last week of 1941 the Japanese initiated a heavy offensive in N. Hunan with the object of preventing Chiang Kai-shek from sending troops to aid the Allies in Burma; but the operations ended in defeat, costing the best part of four divisions. On Dec. 3, 1943, after 15 days' siege, in which fewer than 300 men defending the city survived, the Japanese took Changteh, but after six days were



Hump-back Whale. A summer visitor to the Irish and Scottish coasts

Hall, Cambridge, he was called to the bar in 1889, and became counsel to the crown at the Middlesex sessions. Junior counsel at the C.C.C., 1908, and senior counsel, 1916, he became recorder of Chichester and, in 1926, of Cambridge. He was knighted in 1925, and in 1928 was appointed a judge of the king's bench division, retiring in 1951. In 1946 he published a light-hearted book of reminiscences, *Criminal Days*. He died in London Feb. 20, 1956.

Humphry, OZIAS (1742-1810). English painter. Born at Honiton, Sept. 8, 1742, he studied art at the St. Martin's Lane academy, and then at Bath under Samuel Collins, whom he succeeded in his practice

driven out. In June, 1944, however, the Japanese succeeded in capturing Changsha, and pushed rapidly S. until they had secured control of the rly. line throughout the prov. In May, 1945, the Chinese 6th army, flown in over "the Hump" with guns, horses, and equipment by U.S. air transport command, began a drive in Hunan before which the Japanese retreated N., to concentrate at Hankow in Hupeh prov.

Hunchback OR **HUMPBAC**. Deformity due to curvature of the spine, which in severe cases causes an angular mass to project from the back. The condition is nearly always due to tuberculous disease of the vertebrae, or to injury in early life. When the bony structure has been actually destroyed, the most that can be hoped for is arrest of the disease. Milder forms of hunchback sometimes result from rickets.

Of historic hunchbacks one of the more notable was Richard III of England, called Richard Crookback. Andrea Solari, 1458-1516, the Italian painter, was called Il Gobbo, i.e. the hunchback.

Hundred. Name given to a division of most of the English counties. Its origin is doubtful, one theory being that it was the area upon which, in Anglo-Saxon times, a hundred warriors lived, and another that it contained 100 hides. Hundreds varied much in size, and are first mentioned in England in the time of Edgar, though undoubtedly in existence before then. The hundred had its own court and sent representatives to that of the shire. It had a hundredman, and the inhabitants were responsible collectively for the maintenance of the peace, courts being held frequently. They were composed of representatives from the townships in the hundred.

Twice a year a full or special court was held, the sheriff attending on these occasions to try criminals. Gradually most of the hundred courts fell under the control of the lords of the manor, and from about the 16th century ceased to have much importance. Until 1886 the hundred was liable for damage to property caused by rioters, but its interest now is solely historical. In Yorkshire, Lincolnshire, and other parts of England where Danes settled, the hundreds are called wapentakes; in Northumberland and Cumberland they are wards.

Hundred Days, THE. Name given to the period between Napoleon's return from Elba and his de-

feat and surrender after Waterloo. On March 1, 1815, he landed at Cannes and on the 20th he entered Paris. The hundred days are counted from then until June 28, when Louis XVIII returned to Paris. See France: History; Napoleon.

Hundred Years' War. Struggle between England and France that lasted from 1338 to 1453. It began with the claim of Edward III to the crown of France, although there were other causes of quarrel between the two nations. The English kings were still rulers of Gascony and Guienne, in itself a source of discord, while France had assisted Scotland against her ancient foe, and both sovereigns were busy seeking alliances in the Netherlands. Edward opened the contest by crossing to France with armies in 1338-39. In 1340 he won the battle of Sluys, and then for a few years he fomented civil war in Brittany.

In 1346 the English king invaded France again, won his great victory at Crecy, and took Calais. His armies in the south won successes equally useful, and then followed a truce. Soon renewed, the war had as its chief incidents the English capture of Guienne, and, in 1355, an attempt at peace. In 1356 another English invasion culminated in the victory at Poitiers, while half France was ravaged at this time. In 1360, when the English were actually besieging Paris, the first period of the war was ended by the treaty of Bretigny (q.v.).

In 1369 the war broke out again. As ruler of Aquitaine, the Black Prince had made himself hated, and his vassals appealed to the king of France. John of Gaunt went over with an army and ravaged France as before, and the Black Prince stormed and destroyed Limoges. The French won back a good deal of their land, while, in 1372, they crippled an English fleet in La Rochelle.

In 1377, almost in the week of Edward's death, the truce ran out. The French landed in Sussex, while the English were again beaten in France. Under John of Gaunt a great force was sent across. Brest and Cherbourg were given up to England by arrangement with their owners, Charles, king of Navarre, and the duke of Brittany, but the English were repulsed before St. Malo. In 1390 a truce for five years was made. In 1396 a peace was concluded, the English possessions being reduced to Calais and a district in the south from Bordeaux to Bayonne.

The dethronement of Richard II in 1399 was the starting point of fresh trouble. He was the son-in-law of the French king Charles VI, and in 1400 there was some talk of war. It was deferred, however, until 1403, when the French, without warning, sent out a fleet which sacked Plymouth, and an army that invaded Guienne. In 1410, Henry IV in reply formally allied himself with the duke of Burgundy and sent over an army which helped to relieve Paris from the rival faction, that of the Orleanist princes. The Orleanists then bought the support of Henry by very liberal promises, and an English force went to their assistance. On Sept. 25, 1413, a truce was made.

The Success of Henry V

Coming to the throne in 1413, Henry V prepared to attack France in earnest. He revived the claims of Edward III; these refused, he landed with his army in France in 1415, captured Harfleur, won the victory of Agincourt, and seized many Norman towns. In 1417 he invaded France again, this time capturing Caen and Rouen. The extent of his successes, which, however, were greatly helped by the internal condition of France, was seen by the terms of the treaty of Troyes, signed in May, 1420. By this Henry was recognized as the heir to the throne of France, meanwhile acting as regent for the mad Charles VI.

Many Frenchmen refused to submit to this humiliation, and a party under the dauphin, afterwards Charles VII, prepared to press his claims against those of Henry. The English king, however, continued his victorious career, entering Paris in May, 1422, but in the same year he died.

Under the direction of Bedford the English armies continued the conquest of the country. Victories were won at Crevant and Verneuil and at last Orleans was invested. In 1429 Joan of Arc appeared. Quickly the English were driven from Orleans and defeated at Patay, while Charles was crowned at Reims. The capture and death of the maid did not arrest the flow of French success, and in 1435 the duke of Burgundy, hitherto on the side of England, joined forces, by the treaty of Arras, with the French. In 1436 Paris was regained by the French, and in a short time the English had only Normandy and Guienne left to them. In 1450, after the battle of Formigny and the capture of Cherbourg, the duchy of Normandy was lost to England. In July.

1453, the defeat of Talbot at Castillon was another blow, and the capture of Bordeaux in Oct., 1453, which sealed the loss of Guienne, may be said to mark the end of the struggle. The English had lost all their possessions in France save Calais. See England; France; Joan of Arc.

Hungarian Dances. Among the dances native to Hungary the principal are the *csárdás*, the *körtáncz* (society dance), and the *kanász-táncz* (swineherds' dance, performed only by the lower classes). The *csárdás*, most popular and best known outside Hungary, consists of two movements, both in common time: the first, called the *lassú*, slow and majestic, and the second, the *friss*, a lively

quickstep. These movements alternate at the desire of the dancers. Characteristics of the Hungarian, or Magyar, dance tunes are synopated rhythm called *alla zoppa* (in a limping manner), and the liberal use of embellishments. Arrangements of Hungarian dances were published by Brahms, Dohnányi (Ruralia Hungarica), and Bartók.

Hungarian Rhapsodies. Set of 14 pieces for the pianoforte by Franz Liszt, published 1853-54, and later orchestrated by the composer. They are free fantasias on Hungarian melodies, short transcriptions of tunes played by the gipsy bands of Hungary, most of which occur in his *Mélodies Hongroises* published between 1839 and 1847.

HUNGARY: THE LAND AND ITS HISTORY

Walter Jerrold and Henry Baerlein

This article is supplemented by those on the towns of Hungary. For later history see the Novissima Verba section at the end of this work. See also Austria-Hungary; Hapsburg; also the lives of Francis Joseph, Horthy, Maria Theresa, and other rulers

From 1867 to 1918 Hungary formed part of the Austro-Hungarian Empire. It then had an area of 126,000 sq. m. and consisted of a great and a minor plain astride the Danube (Duna) river with a mountain bastion, the Carpathians, on the N. and E.; a series of Alpine foothills on the W.; an Adriatic coast-line and a Karst mountain system on the S.W.; and a river frontier on the S.E. By the treaty of Trianon, 1920, Hungary was reduced almost precisely to the great plain, the Alföld; only on the W. did it extend over the Bakony Forest towards the edge of the foothills, the elevation nowhere exceeding 2,000 ft., and about nine-tenths of the area was below 600 ft. The N. mts. were given to Czecho-Slovakia, the E. plateau and mts. to Rumania, the W. foothills to Austria, and the S.W. prov. of Croatia-Slavonia, which was never a part of Hungary proper, to Yugoslavia.

The great N.-S. stretch of the river Danube on which Budapest stands almost bisects the country. The Tisza (Theiss) enters N.E. Hungary near its exit from the Carpathian valleys, curves to its great bend at Csap on the frontier, and leaves Hungary just S. of Szeged. The lower courses of the threefold Körös are in Hungary, as is the greater portion of the Győr river. The Drave forms part of the frontier with Yugoslavia. Lake Balaton, 50 m. long, 2-7 m. broad, and the largest lake in central Europe, lies in W. Hungary.

The area of Hungary is 35,785 sq. m., and the pop. 9,319,992, of whom 92.8 p.c. are Magyar-speaking. Budapest (pop. est. 1,026,883) is the capital. The largest religious groups are R.C. (65.7 p.c.); Helvetican Evangelicals (20.8 p.c.); Augsburg Evangelicals (6 p.c.).

Hungarian rlys. (total length 5,428 m., of which 4,933 m. belong to the state) radiate from Budapest. Only 636 m. are double track.

HISTORY. That part of the ancient Pannonia which was to become known as Hungary may be said to have begun as a separate state with the arrival of the Magyars under Arpad in the 9th century A.D., although its name seems to derive from the earlier Hun immigrants into central Europe. In the 5th century it had been occupied by the Huns under Rugilas, uncle of Attila; in the 6th it was overrun by the Avars (Abares), and c. 890 by the Magyars. The connexion of the Magyars with the earlier conquerors is indefinite.

The descendants of Arpad bore the title of duke until Stephen (977-1038), the son of Duke Geysa, assumed the title of king. Stephen's mother was a Christian, and he was at great pains to force the new religion on his people. He was recognized as monarch by the pope and granted the title of Apostolic King, borne by the rulers of Hungary until it became a republic. Stephen, canonised in 1083, made of the old loose military republic of Hungary a constitutional kingdom, with three diets or assemblies repre-

sented the Magyar prelates, magnates, and inferior nobles; the mass of the people being in effect serfs. His reforms included the division of the country into self-governing counties. He was succeeded by his grand-nephew, Peter, who started the country on a long period of internecine strife.

Though, under Stephen, a constitution had been established, Hungary had, in effect, been governed wholly by its kings. In 1205 Andreas II became king. A weak man, he alienated his nobles, who at length compelled him to recognize and reform the constitution in the Golden Bull or great charter of 1222. In accordance with this the Hungarian parliament had to be assembled once a year, and the king, for the first time, had to take an oath to observe the constitution. The successor to Andreas II, in 1235, was Bela IV, in whose reign fresh hordes from Asia overran Europe, and Hungary suffered severely.

Bela's immediate successors call for no mention, and with Andreas III (d. 1301) the Arpad dynasty came to an end. Though descendants of Arpad had ruled so long, the monarchy was elective and, after two undistinguished kings, Charles Robert of Anjou was elected, and reigned from 1308-42. He did much to promote the arts, commerce, and manufactures of the kingdom. His son, Louis I, the Great, who reigned from 1342-82, was one of the most powerful rulers in Hungary's history; he confirmed the Golden Bull in 1351, and gave to the serfs freedom of movement—the first step towards emancipation and a step which Hungary was the first country in Europe to take. Louis the Great was succeeded (1382-95) by his daughter Mary—King Mary, for only by her keeping the title of king have the Hungarians allowed a woman to wear the crown of S. Stephen. For three-quarters of a century after the death of Louis, Hungary's state was one of anarchy, bloodshed, and disunion, consequent upon misgovernment.

National Hero of the 15th Century

In the first half of the 15th century Janos Corvinus Hunyadi rose to greatness as a military leader against the Ottoman invasions, but at the battle of Varna, 1444, the Hungarians suffered a severe defeat, and their king, Wladyslaw I, was killed. Hunyadi became regent during the minority of the weak Ladislas V, and continued to be the champion of Christendom against the Turks

until his death at Belgrade in 1456. After the death of Ladislas V, 1457, Matthias Corvinus, son of Janos Hunyadi, was elected king, 1458. He is one of those rulers who live in legend as well as in history. The chief blot upon his fame is the leading part which he played in the Hussite Wars. Thus the hero of Hungary became the hated of Bohemia, and when both kingdoms came under the Austrian crown, the bitter feeling then engendered had its share in making unification impossible.

The Peasants' Revolt

After the death of Matthias in 1490, there followed rulers distinguished only for their weakness. In 1514 there was the Peasants' Revolt—put down with pitiless rigour—and on Aug. 29, 1526, the Turks, at Mohacs, inflicted a crushing defeat on the Hungarians. The youthful Louis II lost his life; two-thirds of the kingdom passed under Turkish dominion, and the beginnings were made of that Hapsburg domination which was to extend from Ferdinand I (1526–64) to the 20th century. At first things went smoothly in the severed kingdom, of which Austria ruled the W. part, and Turkey the centre and capital, while the Magyars were left only Transylvania. This division lasted for about 150 years. Under Rudolph II, who ruled from 1576 to 1608,

came an attempt to reduce Hungary to an Austrian province. A rebellion was headed by Stephen Bocskay, a noble who gained the title of prince of Transylvania, and regained the full privileges of the Hungarian nobles and toleration for the adherents to Protestantism. Bocskay was succeeded by Gabriel Bethlen, who won for Transylvania independence from the Hapsburgs.

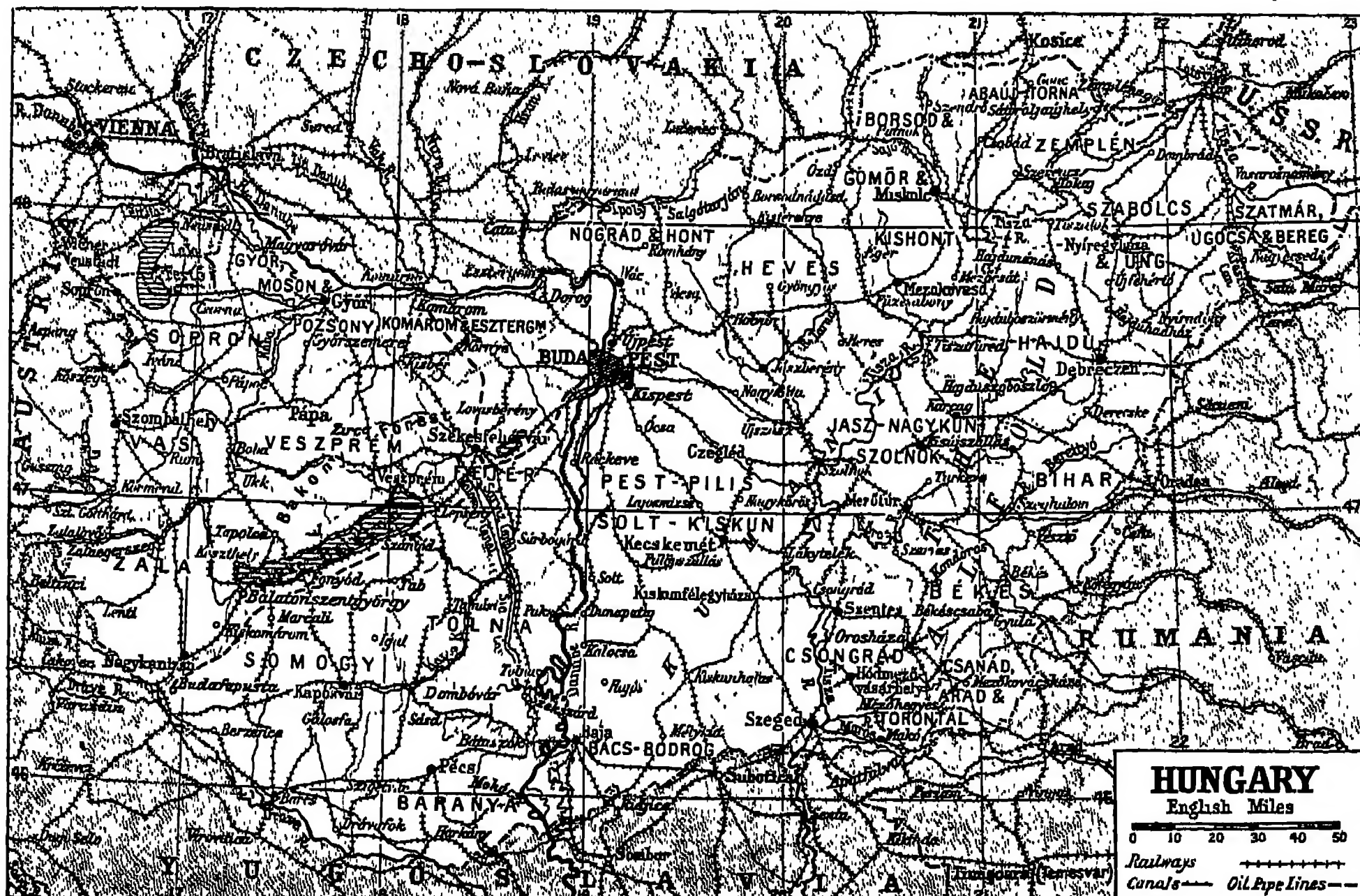
For half a century Transylvania served to safeguard Magyar liberty against the repressive tyranny of its Austrian rulers until the weak rule of George Rakoczi II, from 1646 to 1660, reduced it to the position of a Turkish dependency. After the Hungarians had made a bold bid in 1670 to throw off the Hapsburg yoke of Leopold I, they were subjected to a reign of terror, and in 1673 Leopold abolished the constitution. A rebellion, under Count Stephan Toköly, 1678, led indirectly to the strengthening of the Austrian hold, and the driving of the Turks from Buda and central Hungary. Further fighting went on until Austria and Turkey made peace at Karlowitz in 1699. Fighting was renewed again a few years later when a further treaty, 1718, left Austria in possession of the kingdom.

Meanwhile, the peasants, under Charles Rakoczi, had risen in revolt against their Hapsburg oppressors, and after varying fortunes

won in 1711 from Charles VI (Charles III of Hungary) an important agreement between Hungary and Austria. Hungarian independence was further affirmed by the same ruler in the Pragmatic Sanction of 1723. A period of reform followed, and under Maria Theresa considerable advance was made. Under her son Joseph II, who reigned 1780–90, renewed attempts at Germanising the country led to further strengthening of the national spirit, though a few years later Napoleon, seeking to alienate Hungary from Austria, found it impossible to do so; and for 20 years Hungary took no thought for her own internal condition in her anxiety to save those rulers who were her bane.

Régime of Metternich

Her only reward was the repression and oppression which marked the long Metternich régime up to 1848. Francis I, secured by Napoleon's downfall at Waterloo, refused to fulfil promises made to his Hungarian subjects, or even to summon the diet until his needs in 1825 made it essential. Hungary then granted the men and money asked for. A seemingly small matter at that diet was to have lasting significance. Szechenyi, one of the greatest revivers of the national spirit, addressed the diet in Magyar, instead of in Latin, which had continued the official



Hungary. Map of the European republic, showing the boundaries as settled by the peace treaty of Sept., 1947

language since 1001. A few years later it was claimed that Magyar should supplant Latin in all official documents and courts of law.

Shortly after Szechenyi's innovation, Lajos Kossuth (*q.v.*) began to distribute reports of the diet's proceedings, and was imprisoned. Another noble, who made a speech demanding that peasants and nobles should be equal before the law, was sentenced to three years' imprisonment in 1839. In 1835 Francis I had been succeeded by Ferdinand I, whose mental weakness left Metternich in almost absolute power. The rapidly growing national spirit found a great leader in Kossuth, who, released in 1840, rapidly won popularity. When the Paris revolution of 1848 broke out, Hungary and Austria responded. Metternich fled, and the emperor sought to play off Croats and Serbs against the Hungarians, and so precipitated the declaration of Hungarian independence, April 14, 1849.

Downfall of Kossuth

Francis Joseph, who had succeeded in Dec., 1848, called upon Russia for help, and, after sanguinary fighting, the provisional government resigned their power into the hands of their military leader, Görgei, as dictator. Görgei promptly surrendered his army to the Russians, and Kossuth and his colleagues went into exile. All the promises made on surrender were infamously ignored, and Hungary was more oppressed than ever. After Austria had been defeated by the Prussians at Königgrätz, 1866, Ferencz Deák regained autonomous independence for Hungary, 1867. The Austrian emperor continued to be king of Hungary; while foreign and naval and military affairs were controlled by joint ministries. The history of this so-called dual monarchy is given under Austria-Hungary.

During the First Great War the fortunes of Hungary were bound up with those of Austria. The common defeat brought common disaster to both, and on Oct. 31, 1918, a revolution broke out in Hungary, and an independent Hungarian People's Republic was proclaimed on Nov. 16, with Count Michael Karolyi (1875-1955) as provisional president. A provisional national council took the place of the two houses of legislature. Despite an armistice entered into with the French general in command of the Allied troops of occupation, Rumanian and Serbian troops invaded Hungarian territory, and Czech forces occupied

Slovakia and the Danube district. Thus Hungary lost the Banat, and the coal-mining region of the north.

The Karolyi government was succeeded, March, 1919, by a Soviet government led by Bela Kun; but this fell at the end of July.

A rival government set up at Arad and Szeged brought about a *coup d'état* on Aug. 7 which resulted in the appointment of the archduke Joseph as governor of state, and of Stefan Friedrich as premier. The Supreme Council in Paris, however, refused to recognize the archduke's appointment, and a repressive government of reactionaries was formed.

Hungary remained nominally a kingdom with a vacant throne, the assembly elected by universal suffrage in Jan. and Feb., 1920, choosing Admiral Horthy as regent. On June 4 a peace treaty between Hungary and the Allies, settling the frontier and other outstanding questions, was signed at the Grand Trianon, Versailles. Charles, the ex-king, who abdicated in Nov., 1918, twice attempted to regain the throne of Hungary before he died in 1922.

Walter Jerrold

Horthy remained in power for nearly a quarter of a century. In the early years of his regime he did much to improve Hungary's economic position, and carried out minor measures of land reform and redistribution. A Nazi party of some strength, which adopted the symbol of the Arrow Cross, arose in the 1930s, but Horthy kept it under control and eventually disbanded it in Feb., 1939, in spite of his close association with Germany, Hungary's best customer.

Vienna Awards

Following frontier disturbances in 1938, Hungary received part of Slovakia and Ruthenia under the first Vienna award of Nov.; and when Czecho-Slovakia was completely dismembered in March, 1939, Hungary occupied the rest of Ruthenia. A second Vienna award, Aug., 1940, gave her at Rumania's expense a large part of Transylvania. She adhered to the Rome-Berlin axis (Dec., 1938), and to the anti-comintern pact (Feb., 1939), but when the Second Great War broke out maintained neutrality until June, 1941, when she declared war on Russia. She received in return great stretches of Czecho-Slovakia. In Dec. she was forced by a British ultimatum into declaring war also on Great Britain and the U.S.A.

The demands made on Hungary for troops by both Germany and Italy increased, and even her great territorial gains failed to reconcile her people to the bitter losses suffered by her forces on the eastern front. Horthy, badgered by the Germans, continued to refuse to furnish in full the troops and supplies demanded, until, returning in March, 1944, from a visit to Hitler at Berchtesgaden, he found Budapest occupied by German troops. The Russians entered Transylvania in Aug., and crossed the frontier into Hungary proper at the beginning of Oct. Horthy asked for an armistice, but, deposed by the resurgent Arrow Cross, fled to Germany. The Hungarian c.-in-c. went over to the Russians, and a provisional government in Russian-occupied Hungary declared war on Germany in December. By Christmas the Russians had surrounded Budapest and in the early part of April, 1945, they drove the last Germans out of Hungary. An armistice was signed in Moscow in Jan., 1945, between Hungary and the Allies. (See Russo-German Campaigns.)

Republic Established

One of the first acts of the provisional government was to abolish in March the ancient feudal system of land tenure under which in 1938, despite Horthy's reforms, 36 magnates had owned more than a million acres while 1,200,000 peasants owned only 950,000 acres. General elections held in Nov. under a new law providing universal, secret, and equal suffrage for men and women, gave the Smallholders 245 seats, the Communists 70, the Socialists 69, other parties 25. The new assembly abolished the monarchy and set up a republic in Feb., 1946. But the decisive electoral victory of the Smallholders did not bring political peace. Conforming with the wishes of the Allies, their leader formed a coalition government. In this the Communists, who held the ministry of the interior and other key posts, continually manoeuvred for greater power until in the winter of 1946-47 they effected the arrest of some 300 army officers and members of the Smallholders' party, alleging that they were guilty of conspiracy against the state.

The arrest on Feb. 25 of Bela Kovacs, secretary-general of the Smallholders, by the Russians on a charge of acting against the Soviet occupation forces as well as of participation in the alleged

conspiracy, gave a new turn to the situation. Several of those arrested earlier were brought to trial at the end of Feb., and after a seven weeks' hearing were sentenced, three to death, others to terms of imprisonment. The prime minister, Ferencz Nagy, on holiday in Switzerland, refused to return to Hungary. A new government was formed, and a new electoral law passed.

In the meantime the peace treaty between Hungary and the Allies, under which Hungary renounced all her territorial acquisitions since Jan. 1, 1938, was drawn up in Paris and signed there on Feb. 10, 1947. It was duly ratified and became effective from midnight of Sept. 15-16, 1947.

After elections in Aug., 1947, a new coalition govt. was formed; it soon passed under Communist control, and the influence of Soviet Russia in Hungary's affairs steadily increased. A constitution on the Russian model was introduced, and those who would not conform were imprisoned. Persecution of the R.C. Church culminated in the arrest, trial, and condemnation to life imprisonment, 1949, of Cardinal Mindszenty. A popular rising against government by dictatorship in 1956 was ruthlessly suppressed by Russian armed forces.

LANGUAGE AND LITERATURE. Hungarian is an agglutinative language having no basic relation to the languages of neighbouring countries, and related to the Finnish. It is now generally acknowledged as one of the Ugrian languages, though some scholars, such as Arminius Vambéry, say that it derives originally from Turkish, with Ugrian elements added. It is, however, more probable that the original stock was Ugrian, and that the Turkish elements were added during long association with the Turkish people as neighbours and conquerors. The literature of Hungary was late in developing. The first Hungarian book, *Budai Krónika*, was printed in 1473, but more than three centuries elapsed before the native literature became anything more than second rate.

Nicholas Zrinyi, 1618-64, wrote a national epic, *The Siege of Szigetvár*, on classic and Italian models; Stephen Gyöngyössi, 1625-1704, was author of a baroque Ovidian epic, *The Venus of Murány*, and of other poems. In the 18th century war for freedom arose the popular Kurucz poetry, lyric patriotism expressed in the army of Rákóczy, while one

of that leader's lieutenants, Count Kelemen Mikes, 1690-1762, wrote much in an attractive style, his most notable work being the published *Letters from Turkey*.

The writer to whom the literary awakening was most notably due was George Bessenyei, 1747-1811, who became a strong Voltairean, wrote plays, stories, etc., and advocated the founding of a national theatre and an academy. Contemporary with him were József Gvadányi, 1725-1801, writer of markedly original national narrative verse, and Benedict Virág, 1752-1830, known as the Hungarian Horace, historian and writer of odes on classic lines. Early in the 19th century began a momentous movement for the reform and enrichment of the Hungarian language. The initiator was Ferencz Kazinczy, 1759-1831, a didactic poet and prose writer.

It was more particularly in poetry that the reawakening Hungarian spirit found expression; only some of the most representative can be cited. Alexander Kisfaludy, 1772-1844, was the first great romantic poet. His brother, Charles Kisfaludy, 1788-1830, one of the creators of the Hungarian drama, was also a writer in lyric verse and novels of country life. His ode on Mohács Field has taken its place as a Hungarian classic. Ferencz Kölcsey, 1790-1828, was a passionately national poet. József Katona, 1790-1830, shared with Charles Kisfaludy in the founding of a national drama.

Michael Vörösmarty, 1800-55, one of the amplifiers of the language and master of a rich lyric style, gained the popular title of the Hungarian Poet-King. Gregory Czuczor, 1800-66, wrote fine epics of old national life, and edited the great Hungarian dictionary which helped to stabilise the literary language. Lajos Kossuth, 1802-94, the patriot leader, though primarily an orator, was also a most impressive writer of prose.

Writers of Drama and Fiction

Alexander Petöfi, 1822-49, won recognition as the greatest lyric poet that his country had produced. Later writers of outstanding merit include Gregory Csiky, 1842-91, a satiric dramatist of considerable power; and Edward Tóth, 1844-76, also a dramatist, and Eugene Péterfy, 1849-99, the chief of Magyar essayists. In fiction the more pronounced success came somewhat later. Andrew Fáy, 1784-1861, was a fabulist who wrote in *The Béteky Family* a social novel expressive of the spirit

of progress of the early 19th century. Nicholas Jásika, 1794-1865, has been dubbed the Walter Scott of Hungary. József Eötvös, 1813-71, was another great novelist of the period, in whose work, it has been said, the Hungarians were revealed to themselves.

Sigismund Kemény, 1814-77, is described by some of his compatriot critics as the greatest of all Magyar novelists: Nearly as great and of world-wide popularity is Maurus Jokai, 1825-1904, whose novels ran into hundreds.

Walter Jerrold

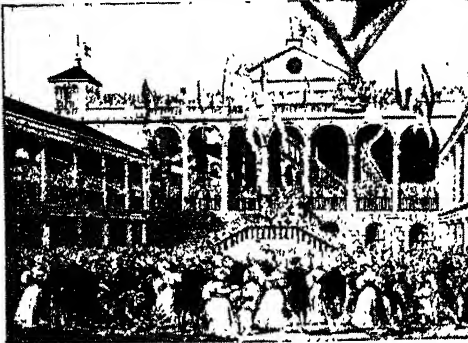
Hungchen. Town and former treaty port in the N.E. provinces of China. It is on an affluent of the Tumen river, 200 m. S.W. of Vladivostok. A small mud-walled town, it dates from 1714, and was opened to foreign trade, 1915. Pop. 8,500.

Hunger. Generally an appetite for food determined by habit. It may arise from the altered pressures of an empty stomach, or be due to a craving for nourishment on the part of the tissues. Abnormal hunger for food is often associated with such conditions as diabetes. Appetite for abnormal foods, Pica, is characteristic of certain conditions, e.g. hysteria. A dislike of favourite foods and a longing for certain possibly unusual articles of diet is often an early symptom of pregnancy.

Air hunger describes a condition of breathlessness seen in the coma of diabetes; in heart failure, when circulation of the blood is poor, and in severe anaemia where there is insufficient haemoglobin to act as a carrier of oxygen to the tissues. Air hunger is also experienced at varying heights round about 20,000 ft. owing to the diminished volume of the blood gases, which can no longer carry out their work of gaseous exchange with the tissues.

Hungerford. Market town and parish of Berkshire, England. On the Kennet, 26 m. W. of Reading, it is served by railway and by the Kennet and Avon canal. A hunting and angling centre, it is noted for its trout fishing. There is a town hall, and in the Bear Inn William of Orange in 1688 met the commissioners sent by James II. The chief industry is an agricultural trade. The town is known for its annual festival, celebrated at Hocktide (q.v.). This commemorates the gift to the townsfolk by John of Gaunt of the manorial rights. Near are Inkpen Beacon, and Littlecote, one of the finest manor houses in the country. Pop. (1951) parish, 3,020.

Hungerford Market. An old London market. Built originally in 1669 and enlarged in 1831-33, it was pulled down in 1862 to make room for the Charing Cross terminus of the Southern rly. It took its name from Sir Edward Hungerford (1632-1711), who, when his house was burnt, 1669, secured the right to erect a market in its grounds as a means of repairing his broken fortune.



Hungerford Market, London, on the opening day, July 2, 1833. The occasion was celebrated by a balloon ascent, seen on the right
From a contemporary drawing

The existing Hungerford Bridge, built 1860-64, is partly supported upon the piers of the old Hungerford suspension bridge, made for foot passengers only, the chains of which were used for the bridge across the Avon at Clifton, near Bristol. It was hit by a flying bomb in 1944 as a result of which the footbridge was closed for a time; rly. traffic was not suspended.

Hunger Strike. Refusal by a prisoner to take food. This occurs usually either as a protest against the legality of the sentence or in the hope of inducing the authorities to remit it rather than acquiesce in the prisoner's voluntary death. This method of resistance to authority was resorted to by many of the militant suffragists during their campaign to secure votes for women. It was met by legislation, popularly known as the Cat and Mouse Act, under which prisoners were provisionally released but were liable to re-arrest as soon as their health was sufficiently restored for them to continue serving their sentence. During 1913 Mrs. Pankhurst and 182 other suffrage prisoners came under the effects of the Act.

The hunger strike was again resorted to in 1920 by a number of Sinn Feiners who refused to recognize the jurisdiction of British courts. After the death of Terence MacSwiney (*q.v.*) through hunger-

striking the method was generally acknowledged to have lost its efficacy.

Hunger strikes were frequently practised by Quakers, both men and women, during the persecution of the 17th century. Barbara Blaugdone fasted for six days and nights in the Bridewell at Marlborough, and on another occasion for 14 days and nights in Exeter gaol "as a witness against that dark, professing people" who had persecuted her; and John Evelyn, in his diary under date July 8, 1656, mentions his visit to some Quakers in Ipswich gaol, one of whom was said to have fasted 20 days, while another perished on the tenth day of his fast.

The moral responsibility for the death of a hunger-striker as a result of his voluntary starvation is a matter of debate. On two occasions the death of a Quaker in prison was claimed by his persecutors as the result of his "wilful rejecting of his natural food," but the verdict was repudiated by Fox and other Friends as a shameful accusation. On the other hand, during the controversy about the hunger strike of Terence MacSwiney several eminent R.C. priests declared their opinion that death by voluntary starvation was a form of self-murder.

Hunnebedder or **HÜNNEBERTEN** (Hun's beds). Folk-name in N.W. Germany and the Dutch prov. of Drenthe for the megalithic tombs of Neolithic age characteristic of the region. They are long, narrow rectangular chambers, with sides of upright slabs supporting capstones, covered by long earth mounds, often, though not always, edged by a line of stones, usually boulders from glacial deposits. The chambers are normally entered from one side and were used for multiple burials.

Huns. Name of a people of Asiatic origin who invaded Europe in the 4th century. The Mongolian, Turanian, or Tartar peoples of Central Asia periodically poured huge migratory hordes of nomadic warriors into Europe. One of these hordes bearing the name of Huns, a name which became a byword for

merciless savagery, crossed S. Russia, subjugating or wiping out the populations, and subduing amongst other tribes the Ostrogoths, at the end of the 4th century A.D. In the second quarter of the 5th century their khan was the mighty warrior Attila (*q.v.*), who towards the middle of the century swept with his devastating armies across central Europe, but was flung back at the battle of Châlons, 451. After his death the Huns broke up under their tribal chiefs, and probably were absorbed into the later hordes invading Europe.

The term Huns was applied to the German troops in the First Great War. It had its origin in an address by the kaiser to the soldiers he sent to join the Allied force in China for the relief of the Pekin Legations in 1901. After referring to himself as the modern counterpart of Attila, he exhorted his troops to "gain a reputation like that of the Huns under Attila." The ruthlessness of his troops in the First Great War confirmed the popular application of the term Huns (or sometimes collectively, the Hun) to the German soldiery. See Attila.

Hunsbury Camp. Late-Celtic settlement upon Hunsbury Hill, 2 m. S.W. of Northampton, England. Within an oval earthwork, 560 ft. by 445 ft., 300 refuse pits were excavated in 1890-86. The remains, mostly in the Nottingham museum, include 150 quernstones, 8 spindle-whorls, weaving combs, iron saws, animal bones, and charred corn. Two ornamented bronze sword-scabbards, spearheads, bridle-bits, and a chariot wheel suggest a military element; fibulae, glass beads, scrolled pottery, and iron currency bars betoken a high degree of comfort.

Hunstanton. Urban district of Norfolk, England, correctly called New Hunstanton during 1894-1953. It stands on the E. side of the Wash, 15 m. N. of King's Lynn, and consists of two wards, St. Edmund's (formerly New Hunstanton), and St. Mary's (formerly Old Hunstanton), in which stands the fine old church of S. Mary with interesting monuments, and a Tudor house, home until 1949 of the Le Strange family who held an estate at Hunstanton from the Norman Conquest. The attractions of Hunstanton as a family resort include golf links and fine sands. Pop. (1951) 3,419. During the phenomenally high tide of Jan. 31-Feb. 1, 1953, 33 persons were drowned here in the floods. *From hunston.*

Hunt. The name used in Great Britain for an association of men who maintain dogs with which to hunt the fox, otter, or other animal, over a certain district. Hunts in England include the Belvoir, Meynell, Quorn, Pytchley, etc. At the head is the master, usually a landowner or other person of importance; of the paid servants the chief is the huntsman, who has whippers-in and other assistants. The pack of hounds is maintained in kennels at some central spot, and is usually supported by subscription, although some packs are the private property of the master, who meets all expenses. See Foxhunting.

Hunt, ALFRED WILLIAM (1830–96). A British painter. Born at Liverpool, Nov. 15, 1830, he was educated at Liverpool College and Oxford, where he became a fellow of Corpus Christi College. In 1854 the success of a small landscape at the Royal Academy decided him to adopt a painter's career. In 1864 he was elected a member of the Old Water Colour Society. His chief successes were water colours. He is remarkable for his minuteness in observing nature and his delicate precision in recording it, and his pictures have been much sought after by collectors. He died May 3, 1896.

Hunt, HENRY (1773–1835). A British politician. He was born at Upavon, Wiltshire, Nov. 6, 1773, where his father was a farmer and landholder. He engaged in farming, but joined the radical reformers. He had been



Henry Hunt,
British politician

twice in prison when he unsuccessfully contested Bristol in 1812; first in 1800 for challenging the colonel of his yeomanry troop to a duel, and again in 1810 for assaulting a gamekeeper. From 1816 he was a prominent speaker at reform demonstrations in London, and he presided at the similar meeting in St. Peter's Fields, known as Peterloo (*q.v.*), at Manchester, Aug., 1819.

Imprisoned for two years in Ilchester gaol for his share in the Peterloo meeting, he was elected M.P. for Preston in 1830, but, defeated in 1833, gave up politics to become a blacking manufacturer. Known as Orator Hunt, he died at Alresford, Hants, Feb. 15, 1835. See *Memoirs, Henry Hunt*, 1820.

Hunt, SIR (HENRY CECIL) JOHN (b. 1910). British soldier, leader of the first successful Everest expedition. Born June 22, 1910, and educated at Marlborough and Sandhurst, he was commissioned in the King's Royal Rifle Corps in 1930. After service with the Indian Police 1934–35 and 1938–40, he commanded the 11th battn. K.R.R.C., 1944, and the 11th Indian Infantry bde., 1944–46. In 1956 he retired with the hon. rank of brigadier. For his leadership of the successful Everest expedition of 1952–53 he was knighted, 1953. He published *The Ascent of Everest* in 1953.

Hunt, (JAMES HENRY) LEIGH (1784–1859). British writer. Born at Southgate, near London, Oct. 19, 1784, he was educated at Christ's Hospital. In 1808 he joined his brother John in running a weekly newspaper, *The Examiner*. He had already done some journalistic work, notably dramatic criticism for *The News*, an unsuccessful venture of his brother's. Leigh Hunt acted as editor of the new paper, the radical views of which brought it several times into conflict with the authorities; in 1813 he was sentenced to two years' imprisonment and a fine of £500 for libelling the Prince Regent. During his imprisonment he was visited by Moore, Byron, and other sympathisers, and wrote the narrative poem *The Story of Rimini*.

In 1821 a proposal was mooted by Byron and Shelley for the establishment of a new quarterly magazine in which Hunt should cooperate, and in the following year Hunt with his wife and seven children arrived in Italy, where Byron and Shelley were staying. Within a week, Shelley had been drowned; Byron and Hunt proved antipathetic, and the new magazine died with the fourth number. The Hunt family returned to London in 1825; and in 1828 appeared *Lord Byron and Some of his Contemporaries*; the book is now regarded as of great historical interest, but its publication at the time was regarded as a breach of good taste. For the rest of his life Hunt was continuously engaged in journalistic and literary

work, but owing to his unbusiness-like ways he was in constant debt. In 1847 he received a civil list pension of £200 a year. He died at Putney, Aug. 28, 1859.

Others of his works were *The Feast of the Poets*, 1814, *Wit and Humour*, 1846, and an admirable *Autobiography*, 1850. Charming though much of Leigh Hunt's poetry is, he lives by his prose writings, illuminated by delightful humour and fancy. Dickens was surprised that Hunt was upset by the admitted likeness of Skimpole in *Bleak House* to himself, and promptly changed that character's first name from Leonard to Harold. See *Pre-Raphaelites*; consult also *Life of Leigh Hunt*, C. Monkhouse, 1893; *L. H.'s Relations with Byron, Shelley, and Keats*, B. Miller, 1910. *Life*, E. Blunden, 1930.



Leigh Hunt

Hunt, WILLIAM HOLMAN (1827–1910). A British painter. Born in London, April 2, 1827, he was the son of a city warehouseman, was educated for commercial life, and began work as an assistant to an estate agent. He began to study art in the British Museum and the National Gallery in 1843, entering the Royal Academy Schools the following year. There he formed the friendship with Millais which lasted a lifetime. He began to exhibit at the Academy in 1846.

In 1848 his *Madeline and Porphyro* attracted the attention of Rossetti, who asked that Hunt be allowed to work under him. The same autumn, Hunt, Millais, and Rossetti founded the Pre-Raphaelite Brotherhood (*q.v.*). Hunt alone maintained the original precepts and technical methods of the Brotherhood throughout life.

His strong religious convictions were revealed in many of his pictures. Ruskin, another lifelong friend, welcomed in him a religious passion hitherto unknown in British art. Hunt made three journeys to Palestine, to paint Biblical and Eastern subjects with absolute



W. Holman Hunt.
British painter

fidelity. He also visited Italy, Greece, and Egypt. In 1856 he offered himself as candidate for A.R.A., but received only one vote.

Hunt's best-known paintings include *The Hireling Shepherd*, *The Finding of Christ in the Temple*, *Valentine and Sylvia* (Birmingham), *The Shadow of Death* (Manchester), *Christian Priests escaping from Druid Persecution*, *The Triumph of the*



W. Holman Hunt. *The Light of the World*, the best known of this artist's masterpieces
Kemble College, Oxford

Innocents (Liverpool), and *The Light of the World* (Kemble Coll., Oxford, with replica in S. Paul's Cathedral). Much of his colour has a harsh enamel-like quality, and there is a tendency to elaborate detail at the expense of artistic unity. But in his own lifetime he was highly esteemed both as man and as artist. He was awarded the O.M. in 1905. In the same year he published his *Pre-Raphaelitism and the P.R.B.*, which was virtually an autobiography. Twice married, his wives being sisters, he died in London, Sept. 7, 1910, and his ashes lie in the crypt of S. Paul's. *Consult* W. H. H., A. C. Grimes, 1936; *The Pre-Raphaelite Tragedy*, W. Gaunt, 1942.

Hunt, WILLIAM MORRIS (1824-79). American painter. Born at Brattleboro, Vermont, March 31, 1824, he studied at Düsseldorf, 1846, and under Couture and J. F.

Millet at Paris. He returned to the U.S.A. in 1855, and settled at Boston. An apostle of the Romantic school, he found the American public antagonistic to his theories, and his life was nearly ended when he was commissioned to execute the mural paintings in the Capitol at Albany, by which he is best remembered. At Boston he preached his views to a large number of pupils, and in 1875 embodied them in a book, *Talks on Art*. Portraits, genre, history, and landscape were all subjects for his clever if eccentric brush. His portrait of Lincoln and *View of Gloucester Harbour* are notable. He was drowned Sept. 8, 1879.

Hunt Cup, ROYAL. Handicap horse-race. Instituted in 1843, it is an annual event run at Ascot on the Wednesday of the meeting, held in the third week of June. The course is 7 furlongs 166 yards long, straight, and uphill all the way. In 1862 the record number of 37 horses came under the starter's orders, and in 1919 the 4-yr.-old Irish Elegance won with 9 st. 11 lb. in the saddle, the highest weight carried to victory. No horse has won the race more than once. In the years 1915-18 and 1940-44 there was no race.

Hunter. River of New South Wales, Australia. It rises in the Liverpool Range, flows almost due S. to join the Goulburn, then the joint stream flows S.E. to the coast, where on the estuary lies the port of Newcastle. The lower valley is fertile but subject to serious inundations. Shortland discovered coal near the mouth of the river in 1796. Its length is 300 m.

Hunter, SIR ARCHIBALD (1856-1936). A British soldier. Born Sept. 6, 1856, he was educated at Glasgow academy and Sandhurst, and commissioned in the Royal Lancaster Regiment in 1874. Following service in India and Egypt, he became commandant of the frontier field force in Egypt in 1894, and at the battle of Omdurman in 1898 commanded the British div. As Kitchener's chief lieutenant, he was responsible for the defence of Egypt while the former was preparing to recover the Sudan. He commanded the 10th div. at the relief of Mafeking, 1900-01. Promoted full general in 1905, he commanded the Southern army of India 1907-09, was governor of Gibraltar 1910-1913, and held the Aldershot command 1914-1917. He retired from the army in 1918. He was M.P. for Lancaster 1918-22. Died June 28, 1936.

Hunter, JOHN (1728-93). British surgeon and anatomist. Born at Long Calderwood, Lanarkshire, Feb. 13, 1728,

he lost his father when he was ten years old, and, owing to indulgence by his mother, his education was of the slightest.

When 17 he managed the cabinet-making business of a step-brother at Glasgow, acquiring a high degree of manual dexterity. He journeyed on horseback to London and became assistant to his brother William (*v.i.*), studied surgery at Chelsea under Cheseldon, and at S. Bartholomew's under Percivall Pott. He was house surgeon at S. George's, 1756; surgeon, 1768; student at S. Mary Hall, Oxford, 1755-56; and accompanied military expeditions to Belleisle, 1761, as staff surgeon to Keppel, and with the British army to Portugal, 1762.

He began private practice in Golden Square, London, 1763; had Edward Jenner as pupil, during 1770-72; was elected F.R.S., 1767; began to lecture, 1773; and was surgeon-extraordinary to George III, 1776. He built an anatomical museum in Leicester Square, 1784-85; began his operation for the cure of aneurism, 1785, and was appointed surgeon-general, 1790. He died suddenly in S. George's Hospital, Oct. 16, 1793, and was buried in the church of S. Martin-in-the-Fields, whence, in March, 1859, his remains were removed to Westminster Abbey. In 1771 he married Anne Home (1742-1821), author of *My mother bids me bind my hair*, and several other well-known songs.

Hunter was not only an anatomist; he was distinguished in surgery, biology, physics, and pathology, and was a keen student of nature. His pupil and brother-in-law, Sir Everard Home (who edited his *Treatise on the Blood, Inflammation, and Gunshot Wounds*, first published in 1794), destroyed Hunter's MSS. some 30 years after Hunter's death, having in the meantime made extensive use of them. Hunter's other works include studies *On the Venereal Disease*, 1786; *Observations on Certain Parts of the Animal Oeconomy*, 1786; *Observations and Reflections on Geology*, 1859,



John Hunter,
British surgeon

intended as introduction to the catalogue of his fossil collection; and Memoranda on Vegetation, 1860. His collection of over 10,000 specimens (two-thirds destroyed by enemy air action in the Second Great War) was bought by the nation in 1795 for £15,000, and presented to the Royal College of Surgeons, London, in connexion with which the annual Hunterian Oration was inaugurated in 1813. *Consult* Works, 4 vols., ed J. F. Palmer, 1835-37; Lives, D. Ottley, 1835; S. Paget, 1897; Two Great Scotsmen, W. and J. Hunter, G. R. Mather, 1894; John and William Hunter, J. M. Oppenheimer, 1947.

His brother William (1718-83) was born at Long Calderwood, May 23, 1718, and educated at Glasgow university, at Edinburgh, and at St. George's Hospital. He was surgeon-ac-coucheur to Middlesex, 1748, and physician-extra-ordinary to Queen Charlotte, 1764.



William Hunter,
British surgeon
After Reynolds

He was made F.R.S., 1767, and became first professor of anatomy, Royal Academy, 1768; and formed an immense collection of specimens, books, and art objects which he left to Glasgow university. He died March 30, 1783. His chief work was Anatomy of the Human Gravid Uterus, 1774, in Latin, 2nd ed. by E. Rigby, 1843. *Consult* Lives, S. F. Simmons, 1783; R. H. Fox, 1901.

Hunter, Sir William Wilson (1840-1900). British historian and statistician. Born at Aberdeen,



Sir W. W. Hunter,
British historian

Elliott & Fry

July 15, 1840, he became under-secretary to the government of India in 1871, and as director-general of statistics planned and executed in the years 1869-85 a statistical survey of India in 128 vols., condensed 1881 into the Imperial Gazetteer of India. He was president of the Indian education commission, 1882, and a member of the Viceroy's council, 1881-87. Knighted in 1887, he died on Feb. 6, 1900.

Amongst his numerous works are Comparative Dictionary of Non-Aryan Languages of India, 1868; The Indian Empire, Its People, History, and Products, 1882; Dalhousie, 1890. He collected material for an exhaustive History of British India in 5 vols. only two of which were completed, and edited the Rulers of India series 1890-95.

Hunterian Society. Medical society founded in London in 1819, to honour the work of John Hunter. Meetings, some of them dinner meetings, are held at the Mansion House or some city company hall, at which a subject of public medical interest is discussed. The public is admitted and invited to participate. The society awards annually a gold medal for the best essay by a medical practitioner embodying the results of his own observations.

Hunter's Moon. Month or moon next following the harvest moon, which in turn is that which is full on the date nearest the autumnal equinox, the time of harvest. The hunter's moon is so called because hunting begins when the harvest has been gathered in.

Hunting. In its widest sense, the pursuit of anything for gain or sport. It was first a necessity of man's existence, as only by hunting or fishing could he obtain the food necessary to maintain life. He probably used snares to aid his primitive weapons, but a great advance in the practice of hunting came with the invention of the bow and arrow. Centuries of this life made hunting very deeply seated in human experience, and when the necessity for it as a means of livelihood had passed away it remained as an almost universal sport. In certain parts of the world today it still combines both aspects.

Hunting became less imperative with the acquisition of property in cattle and the growth of the practice of cultivating the ground, while owing to man's activities in these and other directions the areas available for it were greatly curtailed, and the number of wild animals greatly reduced.

Hunting was a sport with the Egyptians and other ancient peoples, as it was with the Greeks and Romans. A great variety of animals were hunted, from the lion to the hare, and the value of the dog as an aid to the hunter was early discovered. The English, led by their kings, appear to have been remarkably fond of it, the deer being perhaps their favourite

quarry, while in France it was treated as an art. Edward the Confessor loved it, and William the Conqueror's passion for it was notorious. In a later age it was a prime recreation with Henry VIII, Henry IV of France, and Elizabeth.

At the present day in England and Ireland hunting refers mainly to the pursuit of the fox, but it is also used for that of red deer and the otter. In Scotland the pursuit of the wild stag is more generally called stalking. In other parts of the world other animals are hunted, e.g. the tiger in India and the lion in Africa, while wherever the deer or animals of that type are found there is hunting. *See* Big Game; Coursing; Deer-stalking; Forest; Foxhunting; Game Laws; Shooting.

Hunting. In mechanical engineering, term to indicate variations of speed of an engine when the governor is not controlling it efficiently. When an engine is hunting its speed continuously fluctuates between fast and slow. The term is also applied to the periodic departures from, or oscillations about, the mean speed of an engine-driven alternator or synchronous motor. It is seldom experienced in motors driven by steam turbines or hydraulic power.

In an automatic telephone exchange, a selector is said to be hunting while it is seeking a free outlet in order to connect a calling line. *See* Telephone.

Hunting Dog. Species of wild dog. Found in S. and E. Africa, it resembles a hyaena in appearance, and hunts in packs. *See* Cape Hunting Dog.

Huntingdon. Mun. bor., market town, and co. town of Huntingdonshire, England. It stands on the left bank of the river Ouse, 59 m. from King's Cross, London, and is a rly. junction. Across the river is Godmanchester, the two being connected by a stone bridge dated 1332, while near is Hinchbrook House, the old residence of the Cromwells. The chief churches are those of All Saints and St. Mary, both old buildings restored. There are a town hall, etc. The grammar school was rebuilt on a new site 1939. Other notable buildings are Cromwell House, the successor of the one in which the Protector was born, and the George, a coaching inn with its old galleried courtyard.



Huntingdon
arms



Huntingdon. View of the High Street, looking east. The spire is that of Holy Trinity church

Earthworks remain of a castle built by order of William I. There was a priory here at an early date, and a hospital founded by David I, king of Scotland. The town was incorporated in 1483, and is now governed by a mayor and corporation. Pop. (1951) 5,282.

Huntingdon, EARL OF. British title borne by the family of Hastings, since 1529. Under the Normans Huntingdon was an outlying part of Northumbria, and later its earl was the king of Scotland. About 1336 it was separated from Scotland, and William Clinton was made earl; afterwards the title and honours were held in succession by the two great families of Holand (or Holland) and Grey.

In 1529, George, Lord Hastings, grandson of that Lord Hastings who was put to death by Richard III, was made earl of Huntingdon by Henry VIII. His son Francis, the 2nd earl, was prominent in public life, and from him the title passed down to Theophilus, the 7th earl, a supporter of James II, both before and after his loss of the throne. A later Theophilus, the 9th earl, was the husband of Selina, countess of Huntingdon, and after the death of their son Francis in 1789 a descendant of the 2nd earl took the title. In 1818 his nephew was declared its rightful possessor. From him the present earl is descended. The earl's eldest son is called Viscount Hastings.

Huntingdon's Connexion, THE COUNTESS OF. Religious movement founded by Selina Hastings, countess of Huntingdon (1707-91). It sprang up within the Church of England. The countess, daughter of the 2nd Earl



Selina Hastings, Countess of Huntingdon

Howel Harris (*q.v.*) and others, she opened a college for the training of young ministers. Whitefield officiated at the opening ceremony, for which William Williams wrote in Welsh the hymn, Guide Me, O Thou Great Jehovah. From 1781 the movement was allied to Dissent under the Toleration Act (*q.v.*).

Shortly before the death of the countess a trust was formed for the management of the college. On Aug. 24, 1792, the institution was removed to Cheshunt, and in 1905 to Cambridge. All the students are members of the university, and, though the majority enter the Congregational ministry, they are left entirely free in their choice. The college is now quite separated from the Connexion, but the connexional trust is represented on the governing board.

By a trust deed sanctioned by the court of chancery, Jan. 1, 1899, 40 chapels and mission stations were then in association. The offices of the Connexion are at Huntingdon Lodge, Wormley, Hoddesdon, Herts.

Huntingdonshire or **HUNTS.** South-midland county of England. The county slopes generally from the undulating hilly edges of the midland plain on the W. to the valley of the Ouse, or to the

Ferrers, was influenced by the brothers Wesley, and after the death of her two sons in 1743, and of her husband, the 9th earl of Huntingdon, in 1746, devoted herself to the spread of evangelical religion.

On Aug. 24, 1765, at Trevecca House, Talgarth, South Wales, with the help of

low levels of the Fens. The high ground is arable, while the hedgeless, dyke-bounded fields of the fenland are devoted to heavy crops of wheat or roots. The Nene forms the co. boundary in the N. and the Great Ouse crosses the S. of the co. Boulder clay and gravel rest upon Oxford clay, except in the Fens, where the surface is alluvium; the boulder clay is cultivated for cereals, and the drift of the valleys forms rich meadows.

With little permanent pasture, an increasing area is devoted to wheat; barley, sugar beet, and potatoes come next in importance. After agriculture brick making is the main industry. The county is well served by main railways. Huntingdon, the county town, Godmanchester, St. Ives, and St. Neots are the chief of the numerous small towns. The co. forms one co. constituency. Area. 366 sq. m. Pop. (1951) 60,302.

HISTORIC ASSOCIATIONS. Henry of Huntingdon, in the 12th century, wrote a history of England to 1154, and other works. Oliver



Huntingdonshire. Map of this English south-midland county, chiefly agricultural and pastoral in character

Cromwell was born at Huntingdon. Brampton disputes with London the distinction of being the birthplace of the diarist, Samuel Pepys. Sir Robert Cotton, the 17th century antiquary, was born

at Denton. Cowper lived for two years with the Unwins at Huntingdon. Little Gidding, the home of the Ferrars of the 17th century, has a notable place in J. H. Short-house's novel *John Inglesant*. Consult *Huntingdonshire*, Victoria History, 4 vols.; *The Place-Names of Beds and Hunts*, Mawer and Stenton, 1926; Report of Historical Monuments Commission.

Huntington. City of Indiana, U.S.A., the co. seat of Huntington co. It stands on the Little Wabash river, 25 m. S.W. of Fort Wayne, and is served by the Erie, etc., rlys. The industrial centre of an agricultural area, it ships wheat and other grains, maize, and sugar beet, and has rly. shops, meat-packing plant, creameries, cement works, printing and publishing plants, and factories producing brake linings, cranes and shovels, rubber and sporting goods, chemicals, cedar chests, and radio cabinets. Huntington was settled in 1834, incorporated in 1848, and became a city in 1873. Pop. (1950) 15,079.

Huntington. A town of New York State, U.S.A., in Suffolk co. on Long I. It stands on an inlet of Long Island Sound, 35 m. E.N.E. of New York, of which it is a residential suburb, and is served by the Long Island rly. It includes several villages, among them Northport and Cold Spring Harbour, which is the site of a state fish hatchery, and the laboratories of the Carnegie institute's department of genetics. Oyster fishing, market gardening, and shipbuilding are carried on, but Huntington is chiefly the trade centre for the surrounding area in which wealthy residents of New York have large estates. Walt Whitman was born and lived here. Pop. (1950) 9,324.

Huntington. A city of W. Virginia, U.S.A., the co. seat of Cabell co. It stands on the Ohio river, 50 m. W. of Charleston, and is served by the Chesapeake and Ohio and the Baltimore and Ohio rlys. and an airport. It contains Marshall College, the U.S.A. district engineer's office, a veterans' hospital, and a state hospital for the insane. It is the centre of a bituminous coal and natural gas region, and of a farming area which produces tobacco and apples. There are rly. and locomotive repair shops, factories producing mine cars, steel rails, nickel and alloys, glass containers, thermos flasks, furniture, and oxygen. Huntington was founded in 1869 and incorporated 1871. Pop. (1950) 86,353.

Huntingtower. Castle of Perthshire, Scotland. It stands on the Almond, 3 m. N.W. of Perth.



Huntingtower, Perthshire. The ancient castle, scene of the Gowrie conspiracy

Formerly called Ruthven, it was renamed Huntingtower after the "raid of Ruthven," in which the young king James VI was kidnapped by the 1st earl of Gowrie, 1582. This is dramatically described in Scott's *Tales of a Grandfather*. The castle is also the scene of John Buchan's novel *Huntingtower*. There are extensive bleach works, an 18th century establishment. See Gowrie, Earl of.

Huntly. A police burgh and parish of Aberdeenshire, Scotland. It is 41 m. N.W. of Aberdeen on the railway. Lying at the junction of the Deveron and the Bogie, Huntly is the chief town in Strathbogie, and has an agricultural trade, and hosiery and agricultural implement industries. Huntly castle (known as Strathbogie until 1544), seat of the Gordon family, was built in the 13th century, destroyed in 1594, and restored in 1602; it is now in ruins. George Macdonald, novelist and critic, was born at Huntly. Market day. Wed. Pop. (1951), 4,198.

Huntly, MARQUESS OF. Scottish title borne by the family of Gordon since 1599. In 1449 Alexander Seton, a lord of Gordon, was made earl of Huntly. His mother was the daughter and heiress of Sir Adam Gordon, who was killed in 1402, and his successors took the name of Gordon instead of Seton. The title passed to his son and other descendants. Alexander, the 3rd earl, was a very powerful nobleman in the early 16th century, while he and later earls became great landholders in Aberdeenshire and thereabouts. George, the 4th earl, lost his life and his title for rebelling against Mary. The title was restored to his son George, the 5th earl, a relative of Bothwell. Father and son both became lord chancellor of Scotland.

The 6th earl, George Gordon (1562-1636), was prominent in the time of James VI. In 1589 he rebelled against that king, and again in 1594. More than once he was found corresponding with the Spanish court against his own king. However, not only was he pardoned, but in 1599 he was made a marquess and lieutenant of the north, but he was a prisoner more than once before his death, June 13, 1636.

Huntly's son George, the 2nd marquess, was a royalist during the Civil War, for which he was executed by the Scottish parliament in 1649. This meant his attainder with loss of his titles, but these were restored formally to his son Charles in 1661. George, the 4th marquess (1643-1716), was made duke of Gordon in 1684, a title held by his descendants, together with that of marquess of Huntly, until its extinction in 1836. The marquessate then passed to a distant relative, George Gordon (1761-1853), a descendant of the 2nd marquess. He was already earl of Aboyne, and his son and grandson succeeded in turn to the titles, which included a barony of the United Kingdom—that of Meldrum—dating from 1815. Aboyne Castle, Aberdeenshire, sold by the 11th marquess in 1922, was bought back by the 12th. The marquess of Huntly is the premier marquess of Scotland.

Hunyadi, JANOS CORVINUS (c. 1387-1456). Hungarian soldier. Of gentle birth, he saw military service as a young man under Sigismund, taking part in the Hussite war of 1420. He thus acquired royal favour and in 1438 was made ban of Szoreny, a difficult position on account of its proximity to the warlike Turks. In 1440, the throne of Hungary being vacant, he espoused the cause of Wladislaw of Poland, whom he established on the throne. The next few years he was occupied in resisting the Turks, advancing into their country in 1443.

In conjunction with a large force furnished by the pope he engaged in another campaign against the Turks but, betrayed by his Serbian ally, Brankovich, he suffered an overwhelming defeat at Varna, 1444, in which Wladislaw was killed. Eighteen months later Hunyadi was elected governor of Hungary in the absence of King Ladislas V, who, until 1453, was the prisoner of Frederick III of Germany. During this time he continued his wars against the Turks with varying success, losing the day at Kossovo, 1448, but raising the siege of Belgrade, July,

1456. During the campaign he died of plague, Aug. 11, 1456.

Huon, GULF OF. Inlet of the N.E. coast of New Guinea. Penetrating 50 m. inland, it has several good harbours and numerous small islands. The gulf is 100 m. wide at its entrance. The Markham river enters the gulf at its head. On it lie Lae and Salamaua, Japanese bases in the Second Great War, and centres of fierce fighting. See New Guinea; Pacific War.

Huon Pine (*Dacrydium franklinii*). Tall evergreen tree of the family Coniferae. It is a native of Tasmania, related to the yew. The scale-like leaves overlap. It attains a height of 100 ft., and the close-grained wood is both beautiful and useful, and has an aromatic odour.

Hupei. Prov. of central China, in the Yang-tse valley. Wuhan (formerly three cities, Hankow, Wuchang, Hanyang) is the capital; other large towns are Siangyang, Ichang, and Enshih. The Peking-Hankow and the Canton-Hankow rlys. run through the province from N. to S. There are numerous navigable rivers and lakes. The principal products are rice (it is one of the "rice bowl" provinces), cotton, wheat, tea, iron, and tobacco. The rlys., and wide areas bordering them, were occupied by the Japanese during the so-called "China incident" (1937-1945). Area 72,000 sq. m. Pop. (1953) 27,789,693.

Hurdle Race. Horse race under the National Hunt Committee's rules. No hurdle race is of a less distance than 2 m. except those confined to 3-yr.-olds between Sept. 1 and Dec. 31 inclusive, which may be run over a minimum distance of $1\frac{1}{2}$ m. In all hurdle races there must be not less than six flights of hurdles in the first $1\frac{1}{2}$ m. with an additional hurdle for each $\frac{1}{4}$ m., or part of one, above that distance. The hurdles may not be lower than 3 ft. 6 ins. from bottom to top bar.

Hurdling. Event in athletics. One of the most attractive items in an athletic programme, hurdling races are usually run over a track 120 yds. long, but occasionally over longer distances up to 440 yds. In the 120 yds. sprint the hurdles, which are 3 ft. 6 ins. high and have level top-rails, are placed 10 yds. apart, the first being set up 15 yds. from the starting-point but in longer races the distance between hurdles, which are lower, varies from 20 yds. to $38\frac{1}{2}$ yds. The chief art in hurdling is just to

clear the obstacle and retain the stride in doing so.

Hurdy-Gurdy. Stringed instrument, varying in shape from the lute to the guitar, or viol. The sounds are produced by a rosined wheel rubbing against the strings. A keyboard assists in "stopping" the melody strings, and other strings supply a drone bass, in bagpipe fashion. Portable hurdy-gurdies, each enclosed in a box and worked by a rotating handle, were once a favourite instrument of itinerant street musicians, or "organ grinders."

Hurling or HURLEY. An Irish game played with crooked sticks or clubs and a ball. It is played in a similar manner to hockey, but is of much earlier origin, and is thought to have been originally a game for individual opponents. Each side consists of an equal number of players who may knock or carry the ball with the "hurley," but may not handle it.

Hurlingham. Dist. of Fulham, London. Hurlingham House, Putney Bridge, became in 1874 the h.q. of the Hurlingham Club, formed in 1869 for pigeon-shooting, a sport discontinued there in 1906. The club adopted polo in 1874, and Hurlingham polo association became and remained the governing body for that game throughout the British Commonwealth although polo was not played at the club after 1939. By compulsory purchase in 1951 the L.C.C. acquired two areas of the Hurlingham grounds, 21 acres as a public park, $14\frac{1}{2}$ acres as a housing site. The club retained 43 acres.

Huron. Name of a confederation of Indian tribes once living in Ontario. They were so called in derision by the French, the word meaning lout. Of Iroquois blood, they called themselves Wendat or islander, preserved under the form Wyandot.

Huron. Second in size of the great lakes of the St. Lawrence system. The boundary between the U.S.A. and Canada runs through it. It is 206 m. long, 183 m. broad; average depth 700 ft.; area 23,010 sq. m. (13,900 sq. m. in Canada). The peninsula forming Georgian Bay deeply indents the Ontario coast, while Saginaw Bay projects into Michigan. It is linked by canal and river with Lakes Superior, Erie, and Michigan. The Maitland and Saugeen rivers enter Huron on the E. Canadian side, and Georgian Bay receives the French, Severn, and Nottawasaga rivers, while on the U.S. side are the Saginaw, Au

Sable, and Thunder Bay rivers. The largest island is Manitoulin. Ports on its shores include Bay City, on Saginaw Bay, and Goderich, Kincardine, Owen Sound, Parry Sound, and Sarnia, in Canada. Edible fish abound.

Huron. City of South Dakota, U.S.A., and co. seat of Beadle co. On the James river, 119 m. E. of Pierre, in the midst of an agricultural area, it is served by the Chicago and Northwestern and Great Northern rlys. and an airport. It ships cattle, sheep, hogs, dairy products, maize, potatoes, and lucerne, and has rly. shops and offices, meat-packing and food-processing plants, breweries and bottling works. Huron College is here; and the state fair is held annually. Settled 1880, it became a city 1883. Pop. (1950) 12,788.

Huronian. Name of a group of rocks in the Pro-Cambrian system of Canada, found on the N. shore of L. Huron. They are typically sedimentary in origin, and are made up of sandstones, limestones, etc., or their metamorphosed equivalents. Of importance in them is the Cowganda conglomerate, which is believed by many to be an ancient deposit of boulder clay or tillite, indicative of a very early Ice Age. Iron ore in similar deposits S. of L. Superior long supplied the greater part of the iron industry of the U.S.A. Other economic minerals found in Huronian rocks include gold, silver, lead, copper, and nickel.

Hurrians. Ancient people using an Asianic tongue perhaps akin to Urartian (see Urartu), a fact which may point to the mountains of Armenia as their place of origin. In the second millennium B.C., impelled by a vigorous alien aristocracy with Indo-European names and mastery of the horse, they penetrated into long-civilized parts of Mesopotamia, Anatolia, Syria, and Palestine, and formed a considerable element in the population of these areas. Hurrian influence was strong in the Hittite empire; the Egyptians in their Asiatic campaigns captured numbers of the *marianu* or chariot-owning aristocracy of Hurrian cities, and Hurrian kingdoms, the greatest of which was Mitanni (q.v.), appear in the Tell el-Amarna letters as powers on an equal footing with Babylonia and Egypt. Chief Hurrian deities were the storm god Teshub and sun goddess Hepet.

Hurricane. Name given to the violent revolving storms experienced in the W. Indies and the

Gulf of Mexico. They originate over the hottest parts of the ocean in the regions where the dying trade winds merge into the equatorial calms. Moving along more or less precise tracks towards the temperate zone, they are most frequent in late summer or autumn. The winds round the whirls give mean velocities exceeding 75 m.p.h. and gusts of 100 m.p.h. or more. Sometimes these storms cross the U.S. from Texas to the Great Lakes; the accompanying huge waves cause great damage on the coasts and severe flooding inland, adding to the destruction wrought by the wind.

The storms off the coasts of Queensland are also termed hurricanes, but in the N. Pacific storms are generally referred to as typhoons, and in southern latitudes as cyclones. In the British Isles hurricane winds are occasionally encountered. *See Cyclone; Gale; Typhoon. Consult also Hurricanes: Their Nature and History, I. R. Tannehill, 1938.*

Hurricane. British fighter aircraft. Designed by S. Camm of the Hawker Aircraft company, it was the first standard monoplane fighter with enclosed cockpit, landing flaps, and retractable undercarriage. It had a wing span of 40 ft., a length of 32 ft., and was powered by a Rolls-Royce Merlin liquid-cooled engine giving a maximum speed of 305 m.p.h. Put into service with the R.A.F. in 1937, it formed the bulk of British fighter strength at the outbreak of war and during the battle of Britain (*q.v.*). It was also used in all overseas theatres of operations, by the Fleet Air Arm, and on merchant ships. The Hurricane was armed at first with eight Vickers machine-guns, later with four 20-mm. Hispano cannon. Certain Hurricanes were armed with two 40-mm. guns for anti-tank work. A version known as the Hurribomber carried up to 1,000 lb. of bombs. *See Aeroplane illus., p. 129; Catapult illus.*

Hursley. Parish and village of Hampshire. It is 5 m. S.W. of Winchester, and is noted for associations with Richard Cromwell and John Keble. At Hursley House Cromwell resided after his brief term of office, and the church

of All Saints, restored in the 19th century, contains a memorial to him. From 1836 to 1866 Keble was vicar here, and he is buried in the churchyard. The house, which was the property of Cromwell's father-in-law, was rebuilt after 1880 and, known as Hursley Park, was long the seat of the Heathcotes. Pop. (1951) par., 830.

Hurst. An Anglo-Saxon word meaning a wood or copse. It is also used for a sand-block in the sea or a river. It is very common in English place-names. There are several which are simply Hurst, while to others, *e.g.* Wadhurst and Hurstpierpoint, the hurst is affixed or prefixed.

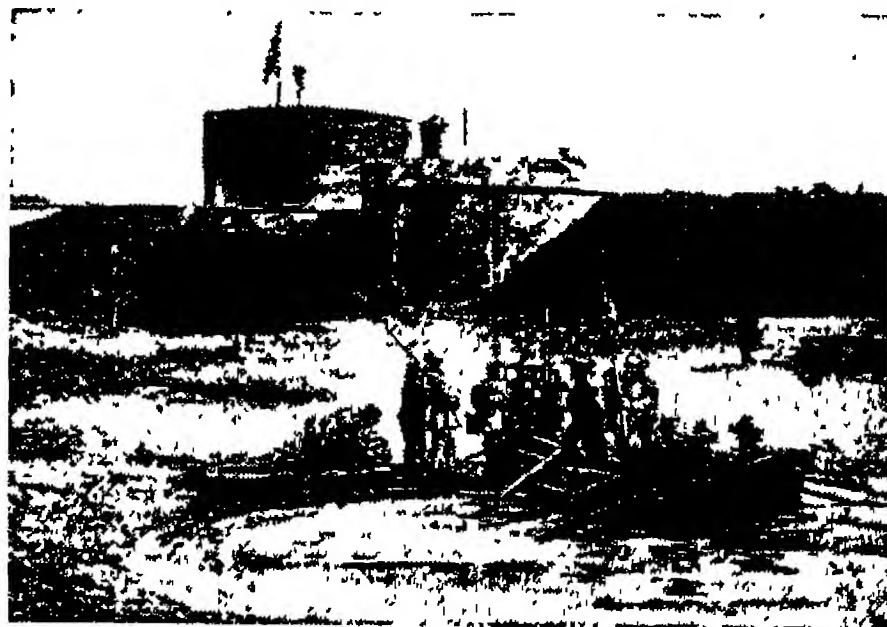
Hurst Castle. A fortress in Hampshire. It stands on a narrow promontory, 3½ m. from Lymington, at the W. end of the Solent. It was built by Henry VIII to guard the strait, and was for a time, in 1648, the prison of Charles I. It is now in the possession of the Admiralty.

Hurstmonceux OR HERSTMONCEAUX. Village of Sussex, England. It lies 8 m. N.E. of Eastbourne. It takes its name from Waleran de Monceux, lord of the manor in the 11th cent. It has a fine early 16th cent. church and is well known for its "trugs" or wooden garden-baskets. Hurstmonceux castle is ¼ m. N.E. It was built, 1446, by Sir Roger de Fiennes, treasurer of the household of Henry VI. The interior was pulled down, 1777, but the outer walls, the main gate house, and towers have remained intact. The castle, later restored, was in 1946 taken over by the Admiralty as h.q. of Greenwich Observatory (*q.v.*). The solar and chronometer depts. and the nautical almanac office were installed by 1950; the move was completed by 1957.

Hurst Park. Racecourse in Surrey, England. It occupies a flat area of ground known as Molesey Hurst, abutting on the Thames, opposite Hampton.

Hurstpierpoint. Parish and village of Sussex, England. It lies at the foot of the South Downs, 8 m. N. of Brighton. Wolstenbury (677 ft.) is the nearest height. The village is connected by half-hourly bus service with Hassocks railway station, 1½ m. away. S. John's college, one of the Woodard Schools (*q.v.*) is in the vicinity. Pop. (1951) parish, 3,629.

Hurtado de Mendoza, DIEGO (1503-75). Spanish author and diplomatist. The famous Lazarillo de Tórmes is attributed to him, and was translated into English by David Rowland, but the ascription is doubtful. Mendoza was in England in 1537, when he made an attempt to bring about a marriage between Henry VIII and the infanta of Portugal.



Hurst Castle, Hampshire, built by Henry VIII for the defence of the Solent, and later the prison of Charles I
From an old engraving

Hurter and Driffeld. A chemist and an engineer respectively who in 1876, after studying the problems of photographic exposure, devised a method for the determination of relative emulsion speeds, thus laying the foundation of the science of sensitometry (*q.v.*). The letters H. & D. followed by a number on a packet of sensitised material indicate its comparative speed. *Consult The Photographic Researches of Ferdinand Hurter & Vero C. Driffeld, ed. W. B. Ferguson, 1920.*

Hus OR HUSS, JOHN (c. 1373-1415). Bohemian theologian and reformer. Born of peasant stock at Husenitz, in S. Bohemia, he was educated at local schools until, about 1390, he went to the university of Prague. There he graduated and remained for some years. He was ordained priest in 1400, and put in charge of the Bethlehem chapel there. In 1402 he was appointed rector of Prague university, where he had been teaching philosophy. Deeply influenced by the writings of John Wycliffe (*q.v.*), his sermons and



Hurstmonceux, Sussex. Main gate house and entrance to the castle
Frith

writings showed that he was a formidable, though not extreme, critic of the Church's doctrine and discipline. At the same time Hus stood out as a strong champion of Czech rights against the Germans, who then exercised the chief control over the university, and



John Hus,
Bohemian reformer

in 1409 Wenceslas, king of Bohemia, altered its constitution so that Czech control was secured by a change in the voting power of the "nations" forming the university. This victory increased orthodox ecclesiastical feeling against Hus.

Hus Condemned as a Heretic

After this success an inquiry was ordered into allegations of heresy in his preaching, notably his avowed admiration for Wycliffe. In 1410, with the authority of a bull of Pope Alexander V, the archbishop of Prague, Sbinoo, ordered the works of Wycliffe to be burnt, and in the next year Hus and his supporters, who included the great majority of the people of Prague, were laid under interdict by Pope John XXIII. Hus stood firm, but his repeated attacks on the principle of papal indulgences brought ultimately a break with the king and the university. In 1412 he left Prague, there being by now a sentence of excommunication on all who should harbour him, and retired to the country districts, where he preached and wrote various theological works, the most noteworthy being his *De Ecclesia*, a survey of doctrine on the basis of Wycliffe's writings.

The affairs of Bohemia had so disturbed the unity of the church that the emperor Sigismund offered Hus a safe-conduct to attend the council of Constance (q.v.), 1414, but on his arrival there the heretic was arrested. Tried before the council, the main charges being founded on excerpts from his *De Ecclesia*, he was condemned, his writings were burnt, and he died at the stake on July 6, 1415. A victim of both nationalist and ecclesiastical jealousies, he died with great bravery, and is generally ranked as a forerunner of the Protestant reformers. His death, however, far from ending the troubles of his country, provoked the wars of the Hussites (q.v.). See Bohemia; Protestantism.

Bibliography. The Age of Hus, H. B. Workman, 1902; Life and

Times of Master J. Hus, F. H. Lutzov, 1909; Pope John XXIII, and Master J. Hus of Bohemia, E. J. Kitts, 1910; Hus and His Followers, J. Herben, 1926; Warrior of God, P. Roubiczek and J. Palmer, 1947.

Husband and Wife. By the common law of England a married woman had no separate legal entity apart from her husband. Since the Law Reform (Married Women and Tortfeasors) Act, 1935, it is no longer legal for a wife to hold property as her "separate property" with the restrictions that attached to property so held. Restraint on anticipation was abolished by the same Act, and an Act of 1949. A married woman can acquire, hold, and dispose of property in all respects as if she were unmarried. Prior to the Married Women's Property Acts, 1870, 1874, 1882, a man could dispose as he liked, *jure mariti*, of all his wife's personalty such as money or shares, and he had control of the life interest in his wife's realty, i.e. land or freehold houses. This freedom of control was qualified by the court of chancery's recognition of trusts in favour of married women, whence grew the system of marriage settlements.

Under such a trust a wife could convey land without her husband's sanction and could bequeath it where she liked by will, but she could be restrained from anticipation by the grantor of the settlement during her married life; in this event she could not borrow money on the security of future rents. This restraint clause was invented by Lord Chancellor Thurlow to protect a wife's separate property from the machinations of her husband. The wife, however, could under the common law neither sue nor be sued alone in respect of such estate. Except in the cases of the wife of the king of England or of an outlaw, a wife could not sue or be sued as a *feme sole* or single woman could under the common law.

Married Women's Property Acts

In England the Married Women's Property Acts, 1870 and 1874, specified various forms of property as the separate estate of a married woman and gave her the same rights in regard thereto as a *feme sole* or single woman, and also affected a wife's contractual rights. These Acts were repealed by that of 1882, which affected all women married since Dec. 31, 1882, and all wives acquiring property since that date. By this a wife was entirely free to dispose of her own property, and to the extent of her

separate estate could make contracts and be liable for them, and might sue or be sued alone on them.

At common law a husband was liable for all debts contracted by his wife before her marriage. By the Act of 1882 the husband's liability for such debts was limited to the amount of any property which he might acquire in her right; by the Act of 1935 this liability for ante-nuptial debts was extinguished. That Act also put an end to his liability for torts—e.g. slander—committed by his wife during the marriage.

As to a wife's debts generally, a man who supplies his wife with necessaries suitable to her station in life is not liable for debts contracted by her without his previous authority or subsequent sanction, but without the latter a wife has no authority to pledge her husband's credit for household necessities. If there has been an account for some time with a tradesman the husband should notify him that he will not hold himself liable for his wife's debts; a public announcement by newspaper advertisement is a course often taken. If a man regularly allows his wife to run up bills in his name, she acts as his agent and he is liable to be called to pay them.

Separated Husband's Liabilities

While living apart from her husband a wife has an implied authority to bind him by her contracts for necessities unless she is supplied with means to provide them herself. This applies if he has deserted her without cause, or has driven her away by cruelty or misconduct, but not if she has left him without good cause or has committed adultery. In judicial separation a wife has no implied authority if alimony is being paid; if not she becomes an "agent of necessity" of her husband, who must pay her reasonable bills. A divorced woman is restored to the contractual position of a *feme sole*.

A wife may be sued alone for torts committed either before or after marriage.

On the death of a wife, if she has left no will, the husband is entitled from her estate to £1000 together with all her personal chattels—e.g. furniture. He receives a life interest on the whole of her estate over that amount if she leaves no descendants, or on half her estate if there are descendants. A wife has similar rights on the death of her husband intestate. Under the Inheritance (Family Provision) Act, 1938, when a husband (or wife) has died leaving

a will which does not make reasonable provision for the maintenance of the widow (or widower), the survivor may apply to the court for reasonable provision out of the deceased's estate.

Huscarl. Scandinavian word meaning man of the household, used for the bodyguard of a king or noble. They first appeared in England attached to Canute, and are mentioned several times in the 11th century. Surrounded by his huscarls, Harold fought at Stamford Bridge and Hastings, and similar bodies were kept by powerful earls. The name disappeared after the Norman Conquest.

Huskisson, WILLIAM (1770–1830). British politician. Born at Birch Moreton, Worcestershire,



W. Huskisson

After J. Graham

March 11, 1770, he was educated partly in Paris. There he mixed with the authors of the Revolution, becoming a member of one of the moderate societies. In 1793 he obtained a position under the British government, and in 1796 he entered the house of commons. A follower of Pitt, he was secretary of the Treasury 1804–06 and 1807–09.

Although a Tory, Huskisson was more advanced in his views than most of his party, and this perhaps was why he remained out of political office until 1823. But he was not silent or uninfluential, and it was during these years that he won his reputation as an economist. In 1823 he was made president of the Board of Trade and its chief adviser on economic questions. He promoted the navigation laws, the introduction of a new sinking fund, and steps in the direction of free trade. In 1827 he became secretary for the Colonies, but resigned in 1828 owing to a difference of opinion with his chief, the duke of Wellington. He was run down and killed Sept. 15, 1830, while standing on the track, lost in admiration of the approaching locomotive, at the opening of the Liverpool & Manchester Rly.: the first person to be killed on any railway.

Huss, JOHN. See Hus, John.

Hussar. The name given to certain light cavalry formations whose chief duties were reconnaissance, scouting, and roving commissions. The original hussars

were Hungarian cavalry raised by Matthias I in 1428. Their success led to the introduction of this type of cavalry into most European armies, together with the distinctive hussar uniform of busby, short-ribbed jacket, and palisse, or hanging jacket, worn over the left shoulder. During the 18th and early 19th centuries, a number of British light dragoon regiments were converted to hussar units, of which there were ultimately twelve: 3rd, 4th, 7th, 9th, 10th, 11th, 13th, 14th, 15th, 18th, 19th, and 20th.

The first hussar battle honour was gained at Dettingen in 1743 by the 3rd King's Own. The 4th formed part of the Light Brigade at Balaclava. The terrain of the S. African War was particularly suited to light cavalry, and the hussars took an active part.

At the outbreak of the First Great War, hussar regiments served as cavalry, distinguishing themselves at Mons and the first battle of the Marne. With the development of trench warfare, most hussar units fought as infantry; the 4th, 10th, and 18th took part in the dismounted cavalry charge at the second battle of Ypres, May 13, 1915. The 7th and 13th Hussars took part as cavalry in the Mesopotamia campaign.

After 1922, the 13th hussars was amalgamated with the 18th, the 14th with the 20th, and the 15th with the 19th, leaving nine hussar regts. In 1928, the 11th Hussars was converted into an armoured car unit, and by 1937 all hussar regiments had been mechanised. Throughout the Second Great War, hussars served with the Royal Armoured Corps as reconnaissance armoured car formations.

Hussein (629–680). Grandson of Mahomet. Son of the prophet's daughter Fatima, he took the part of his brother Hasan, who had been ejected from the caliphate by Moawiya. On Hasan's death Hussein continued the struggle, but was eventually routed and slain at Kerbela, Oct. 10, 680. The Shi'ites observe the day of his death as a day of mourning.

Hussein (b. 1935). King of Jordan. Eldest son of Talal (b. 1909) and grandson of Abdullah, he was born Nov. 14, 1935, and educated at Alexandria (Victoria College), Harrow, and Sandhurst. He became king Aug. 11, 1952, when his father was deposed on account of mental incapacity, and formally ascended the throne May 2, 1953. Hailed as a national hero when in 1956 he summarily dis-

missed Glubb Pasha from his command of the Arab Legion, Hussein subsequently succeeded in holding his own among the mutual jealousies and suspicions of the Arab states.

Hussein, IBN ALI (1856–1931). Arab ruler. Son of Mohammed, who became emir of Mecca in 1827. he was born at Mecca in 1856. In 1870 he married the daughter of a subsequent emir and grand sherif of Mecca. Abdulla. Later he fell into disfavour with the Turks, being forced to live in Constantinople, but was eventually in 1908, appointed emir and grand sherif. He proclaimed in July, 1916, the independence of Arabia and the repudiation of Ottoman rule; then, organizing the Arab forces, and placing the northern army under the command of his son, the Emir Feisal (q.v.), he cooperated successfully with the Allies in the campaign against the Turks. His army captured Yambo, the port of Medina, in July, 1916; and before the end of the year he was formally recognized by the Allies as king of the Hejaz. As the result of the capture of Mecca by the Wahabis he abdicated, Oct., 1924. He was removed by the British to Cyprus, where he lived until 1930, when he went to Transjordan, where his son Abdullah was emir. He died there, June 4, 1931.



Ibn Ali Hussein
Arab ruler

Hussein Kamil (1853–1917). Sultan of Egypt. Born at Cairo, Dec. 20, 1853, the son of Ismail Pasha and a descendant of Mehemet Ali, Hussein finished his education in Paris, and, returning to Egypt, began to take part in the government of the country. After Ismail was deposed in 1879, he, with his father, lived for a few years in Italy, but returned after the fall of Arabi Pasha. Always a supporter of British rule, Hussein became president of the legislative council and general assembly in 1909, but held these posts for little more than a year.

In 1914, when Egypt was declared a British protectorate, Hussein became its first sultan, reigning from Dec. 1914, until his death on Oct. 9, 1917. He left one son, Hussein Kamil-ed-Din, commander-in-chief of the Egyptian army, but was succeeded as sultan by his brother, Ahmed Fuad.

Husseini, HAJ MOHAMMED
EMN EL (b.1895). Arab religious leader and politician, self-styled "grand mufti."



El Husseini, the "Grand Mufti"

Born at Jerusalem, he was educated in Turkey and Egypt. His influential family and other Arab notables had him elected in 1921 as mufti—adviser on and interpreter of Muslim canonical law—of Jerusalem. The title of grand mufti and his description as Seyid, descendant of the Prophet, was of his own creation.

The mufti inspired the anti-Zionist Arab disturbances of 1935-36, and when they failed to achieve their purpose fled to Lebanon; then to Bagdad, where he inspired the Rashid Ali dictatorship; to Teheran, where he lived in the German and Japanese legations until Persia was occupied by Allied forces; and, in 1941, to Berlin, where he was received by Hitler and Ribbentrop. On the Nazi collapse he was captured by French forces and lived near Paris under police surveillance until in 1946 he made his escape by air to Egypt. A new mufti was nominated in his place, Dec. 20, 1948.

Hussites. The followers of John Hus (q.v.). After the burning of their leader at Constance in 1415 the Bohemians, and others who accepted his teaching, formed themselves into a league, which became so powerful that Wenceslaus IV, king of Bohemia, was forced to tolerate them. On his death, 1419, the crown of Bohemia passed to his brother, the emperor Sigismund, who was particularly obnoxious to the Hussites, because it was under his safe-conduct that Hus had gone to Constance. War broke out in 1420 between the emperor and the Hussites, and the opposition of the latter was immensely strengthened by the prevalent Slav feeling against Teutonic encroachments.

Pope Martin V supported the emperor in his struggle, but for eight years no headway was made against the able generals of the Hussites, Ziska and Prokop. Eventually, in 1431, the council of Basel undertook to arrange peace between the emperor and the more moderate Hussites, known as the Calixtines; a formal agreement was ultimately signed in 1436. Meanwhile, the more fanatical Hussites, known as the Taborites, had stood out against compromise,

but they were defeated in 1434. See Bohemia; Protestantism; Reformation; Sigismund.

Hustings (Scand. *hus*, house; *thing*, meeting). Platform or elevated stand on which candidates for membership of the British house of commons used to be nominated, and from which they addressed their constituents. The ceremony of nomination was generally made the occasion of an outbreak of horseplay on the part of



Hustings. A satirical picture by Hogarth showing a scene on the hustings during polling

the audience. After the nomination of candidates, the electors came up on to the hustings, gave their names, and declared for whom they voted, which declaration was recorded. Elections so conducted sometimes went on for several days. Nomination on the hustings was abolished in 1872.

The term was also used for the courts of hustings, which formerly existed in many cities for dealing with actions for the recovery of land within the city limits. The court of hustings of the city of London formerly had probate jurisdiction, and wills were registered there, but all such privileges are now obsolete.

Hutcheson, FRANCIS (1694-1746). British philosopher. Born in Ireland, Aug. 8, 1694, he became in 1729 professor of moral philosophy at Glasgow, where he had already studied, 1710-1716. The remainder of his life was spent in his duties there.

He is generally considered the founder of the Scottish school of philosophy. Man possesses a moral sense of what is right or wrong, which directly approves or disapproves of any course of action. Moral goodness consists in a proper

relation of man's various inclinations founded on the above moral sense. General benevolence and disinterestedness, the endeavour to secure general happiness, constitute virtue. Man also possesses a sense of the beautiful, which judges beauty as the physical taste judges flavour. See Francis Hutcheson. W. R. Scott, 1900.

Hutchinson. A city of Kansas, U.S.A., the co. seat of Reno co. It stands on the Arkansas river, 60 m.

N.W. of Wichita, at an altitude of 1,553 ft. and is served by several rlys. In the centre of a wheat-producing belt, it has flour mills, meat-packing plants, and oil refineries, and ships flour, live-stock, dairy products and lumber. The production and shipment of salt from local salt beds is important. The state industrial reformatory is here. Hutchinson, founded 1871, became a city 1872. Pop. (1950) 33,575.

Hutchinson, ARTHUR STUART MENTETH (b. 1879). British novelist. Born in India, June 2, 1879, he gave up a medical career for journalism, devoting himself to novel writing after he achieved popularity with his fourth book, *If Winter Comes*, 1921. Among his other works are *This Freedom*, 1922; *One Increasing Purpose*, 1925; *Big Business*, 1932; *As Once You Were*, 1938; *It Happened Like This*, 1942.

Hutchinson, JOHN (1615-64). English soldier. Son of Sir Thomas Hutchinson, of Owthorpe, Nottinghamshire, his mother being a Byron, he was born in Sept., 1615. Educated at Nottingham, Lincoln, and Peterhouse, Cambridge, he became a lawyer. When the Civil War broke out he took up arms for parliament, and, on account of his local standing, was made governor of Nottingham castle, which he defended until the end of the war. He sat as M.P. for Nottingham, was one of the king's judges, signing the death warrant, and afterwards a member of the council of state. Disagreement with Cromwell soon drove him into retire-



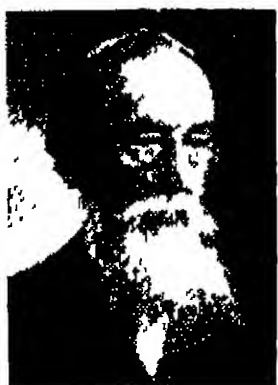
Francis Hutcheson, British philosopher



Col. J. Hutchinson, English soldier

ment, from which he emerged in 1659 to sit in the restored parliament and support Monk. He sat also in the convention of 1660, but was expelled therefrom. In 1663 he was arrested on a charge of being concerned in a plot against the king, and he was still in prison when he died at Sandown, Kent, Sept. 11, 1664. Colonel Hutchinson married Lucy (1620–c. 1680), daughter of Sir Allen Apsley, lieutenant of the tower of London, where she was born, Jan. 29, 1620. She wrote the *Memoirs of her husband*, which give a delightful picture of the man, first published in 1806; a good edition was edited by C. H. Firth, 1885.

Hutchinson, Sir Jonathan (1828–1913). British surgeon. Born at Selby, Yorkshire, July 23, 1828, he was trained at S. Bartholomew's Hospital. He was Hunterian professor at the royal college of surgeons, and its president in 1889 and 1890.



Sir J. Hutchinson,
British surgeon
Elliott & Fry

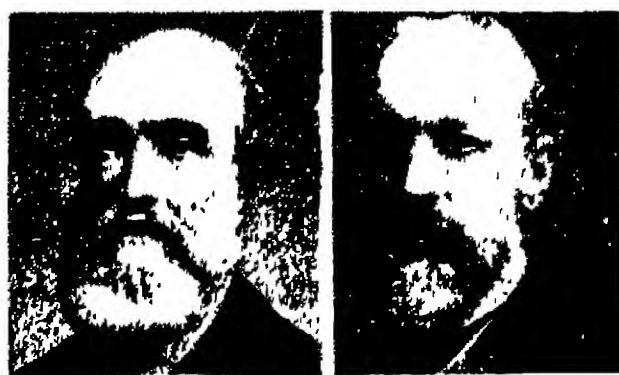
He was a member of the royal commission on small-pox hospitals, 1884, and on vaccination, 1890–96, founder of the London post-graduate school of medicine, and honorary secretary of the Sydenham Society. For nine years he edited *Archives of Surgery*, and wrote and lectured much on gout, neuropathogenesis, leprosy, and syphilis, being recognized as the first authority on these last two diseases. He founded and superintended educational museums at Selby and at Haslemere, where he made his home. Hutchinson was knighted in 1908, and died June 23, 1913. *Consult* Jonathan Hutchinson; *Life and Letters*, H. Hutchinson, 1946.

Hutchison, Graham Seton (1890–1946). British soldier and author. Born at Hampstead, London, June 20, 1890, he was educated at Bradford and Woolwich. He had a distinguished record in the First World War, becoming lieut.-col. Invited by the war office to select officers for the Upper Silesia Plebiscite Commission, he himself went out as secretary and A.D.C. to Col. H. Percival, British commissioner. He became first principal of the Shri Shivaji military school at Poona, 1932. Under his full name, he published an autobiography, *Footslogger*; *Machine Guns, their History and Employment*, and

other books; while under the name Graham Seton he wrote a number of successful works of fiction, notably *The W Plan* (published 1929, afterwards filmed), *The Viper of Luxor*, *The Governor of Kattawitz*, and *The Secret Circle*. He died at High Wycombe April 3, 1946.

Hut-Circle. The remains of a primitive round-hut dwelling. Most are found in rocky country, e.g. Cornwall (Carn Brea), N. Wales. Northumberland, and consist of circles, 6–25 ft. in diam., formed by the collapsed stone walls which were 4–6 ft. thick, roughly faced with stone slabs; the roof was of branches, turf-covered or thatched. A few are Neolithic; many belong to the Bronze Age or later. On Dartmoor there are more than 1,300, the majority Bronze Age; those at Ty Mawr, Holyhead, are late-Roman. Where stone is rare, hut-circles are found marking the sunken floors of former wooden, mud-plastered huts (e.g. at Hayes Common, Kent).

Huth, Alfred Henry (1850–1910). British bibliophile. Born in London, Jan. 14, 1850, he was the second son of Henry Huth (1815–1878), and a grandson of Frederick Huth, a Hanoverian who settled in England in 1809, became



Henry Huth, Alfred H. Huth,
British bibliophiles

naturalised, and founded the banking firm of Frederick Huth & Co. Henry Huth, bibliophile and banker, was an intimate friend of the historian H. T. Buckle (*q.v.*) who helped him in the formation, at a cost of some £120,000, of his extensive library of rare MSS. and prints, and early printed books in English, Spanish, and German. Alfred Henry Huth, had all his father's love of books. Educated at Rugby and Berlin, he travelled as a youth in the East with Buckle as his tutor. He inherited his father's library, which he augmented. Part founder and vice-president of the bibliographical society, vice-president of the Roxburghe club, he published *Marriage of Near Kin*, 1875; *Life and Writings of Henry Thomas Buckle*, 1880; *Goethe's Faustus in English*

verse, 1889, and other books. He died Oct. 10, 1910.

His will gave the trustees of the British museum the choice of 50 items from his library; they selected 13 MSS. and 37 printed books. Alexander Cochrane purchased for some £50,000, and presented to the Elizabethan club, Yale, copies of the four Shakespeare folios and 39 rare Shakespeare quartos. The remainder of the Huth library was sold publicly, Nov., 1911–June, 1920, and realized a total of £278,498.

Hutten, Philip von (c. 1500–46). A German adventurer. He was a member of a party who went to Venezuela under George of Speyer in 1535. Their object was to conquer the land, and on George's death, 1540, Hutten became commander. The following year he led a party of men to find El Dorado, and after a vain search his broken party returned in 1546 to Venezuela, where they were entrapped by Juan de Carvajalos, who had usurped the governorship, and Hutten was treacherously put to death.

Hutten, Ulrich von (1488–1523). German poet and satirist. He was born April 21, 1488, at the castle of Steckelberg, near Fulda. Though the eldest son of a noble family, he seemed so sickly that at the age of 11 he was sent to the Benedictine monastery of Fulda. He fled from there in 1505, quarrelled with his father, and led a wandering scholar's life.

He early attacked papal pretensions in mordant Latin epigrams, contributed to the *Epistolae Obscurorum Virorum*, and wholeheartedly joined in the Lutheran Reformation. He had been crowned poet laureate by the emperor Maximilian in 1517. Driven into exile, he died in his prime on the island of Ufnau, in the lake of Zürich, Aug. 28, 1523. His complete works, *Opera Omnia*, in 7 vols., edited by E. Böcking, were published 1859–62. *See* Reformation; Renaissance; *consult also* Ulrich von Hutten, F. Strauss, 1858–60 (Eng. trans. 1874); Ulrich von Hutten, Knight of the Order of Poets, D. S. Jordan, 1910.

Hutton, James (1726–97). British geologist. He was born at Edinburgh, June 3, 1726, and, although intended for the law, studied medicine, graduating at Leyden, 1749. Again changing his plans, he took to farming, and at the same time turned his attention to geology. After a visit to the Continent, he settled in Berwickshire in 1754, moving in 1768 to



James Hutton,
British geologist
After Raeburn

his earlier paper on rain. Investigations of the Principles of Knowledge, 1794, was his last published work. He died March 26, 1797.

Hutton, Sir Leonard (b. 1916). English cricketer. Born at Fulneck, near Pudsey, Yorks, June 23, 1916, he was tried for Yorkshire in 1934 and played an innings of 196 at Worcester. He showed extraordinary powers of concentration and defence, as well as driving stylishly. In 1937 he scored 2,888 runs, with an average of 56.62. Opening England's innings against Australia at the Oval on Aug. 20-23, 1938, he broke the world record for a test match by score and length of innings—364 in 13 hours 20 mins. He was England's opening batsman in S. Africa, 1938-39; in Australia



Len Hutton,
English cricketer

1946-47; at home against S. Africa, 1947, and in four tests against Australia in 1948; in S. Africa, 1948-49. At Johannesburg, Dec. 27, 1948, he shared with C. Washbrook in a world record test match first-wicket partnership of 359 runs. He had the highest English batting aggregate in 1939, 1948, and 1949. His total of 3,429 runs in 1949, a record aggregate for a Yorkshireman, included the record number of runs scored in one month, 1,294 in June—a feat the more remarkable in that it included three successive scores of 0. The first professional to captain a test team (against India, 1952; Australia, 1953 and 1954; Pakistan, 1954), and to be elected to the M.C.C., 1955, he retired from first-class cricket in 1956 and was knighted in that year. He published *Cricket is my Life*, 1950; *Just my Story*, 1956.

Hutton, Richard Holt (1826-97). British journalist and theologian. Born at Leeds June 2, 1826, he was educated at University School and College, London, and

Heidelberg and Berlin. Influenced theologically by F. W. Robertson and F. D. Maurice, he abandoned Unitarianism for Anglicanism. He edited *The Inquirer*, 1851-53; was joint editor with Walter Bagehot of the quarterly *National Review*, 1855-64; assistant editor of *The Economist*, 1858-60; and, with Meredith Townsend, joint editor and part proprietor of *The Spectator*, 1861-97. Principal of University Hall, London, while he was editing *The Inquirer*, he was professor of mathematics at Bedford College, 1856-65. He died Sept. 9, 1897.

Hutton did much to popularise the philosophy of Walter Bagehot and the poetry of Matthew Arnold and William Watson. Under his direction *The Spectator* became the most influential periodical of its kind in England. His writings include *Incarnation and Principles of Evidence*, 1862; *Bagehot's Literary, Economic, and Biographical Studies*, 1879-81; *Criticisms on Contemporary Thought and Thinkers*, 1894.

Huxley, Aldous (Leonard) (b. 1894). British author. Third son of Leonard Huxley (1880-1933, man of letters and sometime editor of *The Cornhill Magazine*) and grandson of Thomas Henry Huxley (v.i.), he was born July 26, 1894, and educated at Eton and Balliol College, Oxford. His third book, *Limbo*, 1920, a collection of short stories, attracted attention. In the same year he published *Leda*, poems, and this was followed in 1921 by *Crome Yellow*, the first of a series of striking novels, essays, books of travel, poems, etc. With a somewhat bitter wit he combined a philosophical outlook tending increasingly towards mysticism, especially after he settled in the U.S.A. Others of his books were *Antic Hay*, 1923; *Little Mexican*, 1924; *Those Barren Leaves*, 1925; *Jesting Pilate*, 1926; *Point Counter Point*, 1928; *Brave New World*, 1932; *Eyeless in Giza*, 1936; *Ends and Means*, 1937;



Aldous Huxley,
British author

After Many a Summer, 1939; *The Perennial Philosophy*, 1946; *Science, Liberty, and Peace*, 1947; *Ape and Essence*, a satire, 1949; *Themes and Variations*, essays, 1950. *Grey Eminence*, 1941, was a profound study of religion and politics in the life of Richelieu's

agent, Father Joseph. A play, *The World of Light*, dealing with spiritualism, was produced in 1931. He also dramatised an early short story, *The Gioconda Smile*, produced 1948. *The Art of Seeing*, 1943, described how his eyesight, poor from childhood, was improved by treatment.

Huxley, Julian (b. 1887). British biologist and writer. Eldest son of Leonard Huxley and grandson of Thomas Huxley (v.i.), he was born June 22, 1887, and educated at Eton and Balliol College, Oxford, where he won the Newdigate prize, 1908, and took a first in natural science, 1909. After holding academic posts in England and the U.S.A., in 1919 he became senior demonstrator in zoology at Oxford. Fullerian professor of physiology at the Royal Institution, 1926-29, and honorary lecturer at King's College, London, 1927-35, he was secretary to the Zoological society of London, 1934-42. He was made F.R.S. 1938, and was first director of U.N.E.S.C.O. 1946-48.



Julian Huxley,
British biologist

To his technical brilliance he added a gift for popular presentation, and was in demand as a broadcaster; he was a member of the original B.B.C. "brains trust," and of the brains trust as revived for B.B.C. television. Besides technical papers, he published *Essays of a Biologist*, 1923; *The Stream of Life*, 1926; *Religion Without Revelation*, 1927; *Bird-watching and Bird Behaviour*, 1930; *Africa View*, 1931; *At the Zoo*, 1936; *The Living Thoughts of Darwin*, 1939; *The Uniqueness of Man*, 1941; *Man in the Modern World*, 1947. *Soviet Genetics and World Science*, 1949; *From an Antique Land*, 1954; *Towards a New Humanism*, 1957; and many other books.

Huxley, Thomas Henry (1825-95). British biologist and scientist. Born at Ealing, May 4, 1825, he was apprenticed to a doctor, subsequently obtaining a free scholarship at Charing Cross Hospital. Shortly after qualifying with honours, he received the appointment of assistant-surgeon on H.M.S. *Rattlesnake*, then about to start on a surveying expedition in the Torres Straits. The three years' voyage of the *Rattlesnake*

gave Huxley the opportunity of indulging to the full his fondness for zoology, and the results of his observations were embodied in a paper *On the Anatomy and Affinities of the Family of the Medusae*, 1849, which marked a new epoch in comparative anatomy. In 1851 he was elected F.R.S., and granted the medal of the Royal Society in 1852. In 1854 Huxley received an appointment at the School of Mines, which he held for most of the remainder



Thomas H. Huxley

of his life. During 1852-55 he published a number of technical papers, including the important one *On the Morphology of the Cephalous Mollusca*, which placed him in the front rank of biologists. But his great work was as the exponent of the doctrine of evolution, first formulated by Darwin to the Linnaean Society in 1858. The new doctrine aroused the bitterest opposition, and Huxley found it a most congenial task to vindicate a theory after which he himself had been groping in his own scientific researches. His lectures to working-class audiences *On the Comparative Anatomy of Man and the Higher Apes* (published 1863 as *Zoological Evidence as to Man's Place in Nature*), delivered during 1859-62, and *On the Causes of Phenomena of Organic Nature*, widened his sphere of influence. His essays and addresses of the next ten years were fruitful in criticism, and had a lasting influence upon scientific progress and freedom of thought.

During 1862-84 Huxley was a member of ten royal commissions, took part in the work of scientific societies, and wrote many highly

technical papers, in addition to his books and essays. He was one of the first members of the London School Board, 1870, secretary of the Royal Society, 1871-81, and its president, 1881-85, receiving the Copley medal in 1888 and the Darwin medal in 1894. The only honour he would accept was a privy councillorship, 1892. His unremitting labours led to the breakdown of a constitution that had never been strong, and in 1885 he retired to Eastbourne, where he died June 29, 1895.

Honoured by innumerable British and foreign societies, Huxley was one of the outstanding men of science of the 19th century. His remarkable powers of research, his clear exposition of scientific facts, and his accuracy of deduction have rarely been equalled. He not only left his permanent mark upon scientific progress, but laid down many of the foundations of later political, social, and moral reforms.

Huxley's eldest son Leonard (1860-1933), who became editor of the *Cornhill Magazine*, wrote a life of his father, 1900. *Consult also* lives by P. Chalmers Mitchell, 1900; E. Clodd, 1902; E. W. MacBride, 1935; *Apes, Angels, and Victorians*, W. Irvine, 1955.

Aldous and Julian Huxley, two sons of Leonard by his first marriage, are noticed separately.

Huy. Town of Belgium, in the prov. of Liège. It lies on the Meuse, 18 m. by rly. S.W. of Liège. Paper-making and breweries are the chief industries, and in the neighbourhood are the only vineyards in Belgium, also coal mines, iron-works, etc. The dominating feature of the town is the terraced citadel, a fortress built in 1822. The church of Notre Dame, with a fine rose-window, was begun in 1311, and rebuilt in the later Gothic of the 16th century. In the ruined abbey of Neufmoustiers, to the E. of the town, Peter the Hermit, its founder, was buried.

Huygens, CHRISTIAAN (1629-95). Dutch physicist. Born at The Hague, April 14, 1629, he was the son of Constantijn Huygens (*v.i.*). He studied at Leyden and Breda, winning a high reputation in mathematics and astronomy. In the latter science he made a number of improvements in tele-

scope lenses, discovering with their aid, in 1655, Saturn's first satellite, Titan, and the true nature of its ring. In 1660 he visited England, and to him Newton was indebted in developing his laws of motion. In 1678 Huygens announced his wave theory of light, by which he was able to explain reflection and refraction, but he failed to explain the polarisation of light, also discovered by him, by means of the theory. In 1673 was published *Horologium Oscillatorium*. It contained the earliest attempt to apply dynamics to bodies of finite size, and dealt also with pendulum clocks, to which Huygens was the first to apply the device. The first watch regulated by a spring balance was made under the direction of Huygens at Paris, and presented to Louis XIV, 1652. His numerous scientific works were collected and republished in ten vols., 1888-1905. He died June 8, 1695.

Huygens, SIR CONSTANTIJN (1596-1687). Dutch poet. Born at The Hague, Sept. 4, 1596, he studied at Leyden, London, and Oxford. He entered the state service and undertook diplomatic missions to Italy and London, 1621-23, being knighted by James I in 1622. In 1625 he became notary to the prince of Orange, a position he held for 50 years, and in 1630 a member of the privy council. Though not great as a poet in creative ideas, he was unrivalled in mastery of form and language, and as a statesman and writer stands out a lofty figure in Holland's great day. He was a life-long admirer and friend of John Donne. His collected poems, *Korenbloemen*, appeared in 1658, and *Trijntje Cornelis*, a drama, in 1659. He died March 28, 1687.

Huysmans, CAMILLE (b. 1871). A Belgian statesman. Born at Bilsen, Limbourg, May 26, 1871, he was educated at Liège. He became professor of philology at Ypres and later at Brussels. He entered parliament as a Socialist deputy in 1910. Appointed secretary of the international socialist bureau, 1905, he became secretary of the second international, 1914, and took a leading part in organizing its 10th international congress at Geneva, 1920. In 1925 he was minister of science and arts, in 1926 of education. Huysmans was chosen president of the chamber of deputies in 1936. He was mayor of Antwerp at the beginning of the Second Great War, and accompanied the



Christiaan Huygens,
Dutch scientist

Belgian Government to London after the surrender of the Belgian army. He was reinstated as mayor of Antwerp in Sept., 1944, appointed minister of state, 1945, and was prime minister, 1946-47. His published works include *Study in Social Insurance*, 1912; *Four Types*, 1937; *Letters to a Young Socialist*, 1945.

Huysmans, JORIS KARL. Pen-name of Charles Marie Georges Huysmans (1848-1907), French



J. K. Huysmans,
French writer

writer. Born in Paris, Feb. 5, 1848, of Dutch descent, he was a civil servant, but produced a number of books which mark him as one of the most interesting writers of his generation. His first phase was one of uncompromising realism, under a Goncourt-Zola influence, *Marthe*, 1876, and *Les Soeurs Viatard*, 1879, being the best of his early novels. He then turned to studies of extreme decadence, in *A Rebours*, 1884, and of Satanism, in *La Bas*, 1891, in which the chief figures, *Des Esseintes* and *Durtal* respectively, seek to satisfy their aspirations by curious refinements of bodily and spiritual sensation. With *En Route*, 1895, Huysmans entered his final stage, leading the *Durtal* of *La Bas* into a mystical Catholicism which was further developed in *La Cathédrale*, 1898, and *L'Oblat*, 1903.

Huysmans also wrote volumes of art criticism and the life of S. Lydwine of Schiedam, 1901. His style is marked by erudition in phraseology; some of his works have been translated into English. He died in Paris, May 13, 1907.

Huysum, JAN VAN (1682-1749). Dutch painter. Born at Amsterdam, he studied under his father, Justus van Huysum, and became a painter of flower and fruit pieces. Specimens of his work are in the National Gallery and the Louvre. He died Feb. 8, 1749.

Hvar. Yugoslav name of the Adriatic island called in Italian *Lesina* (q.v.).

Hven. Small island in The Sound, belonging to Sweden. It is 9 m. S. of Helsingborg, and was long the home of Tycho Brahe (q.v.). There are remains of his observatory on the island.

Hwai-an. A town of China, in Kiangsu prov. It stands on the Grand Canal and is an important salt-producing centre.

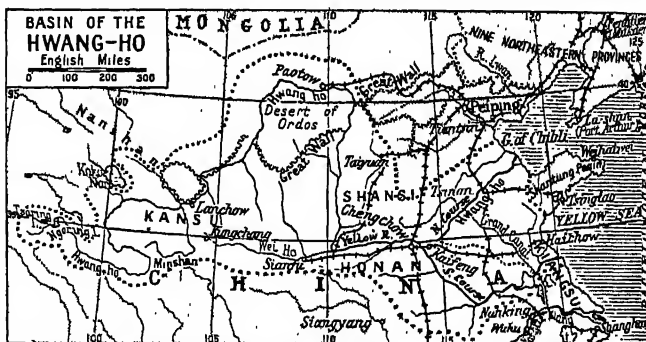
Hwai-ho. River of China. It rises in the S. of Honan prov., and after an easterly course of 450 m. flows into Lake Hungtsch in Anhwei. The river is liable to severe floods, which have often caused widespread devastation; and after the defeat of Japan in 1945 the Chinese government drew up plans for engineering works to control the river's waters.

Hwaining. A town of Anhwei province, China, also known as Anking. On the Yang-tse-kiang, 364 m. W. of Shanghai, it is a port of call for steamers. Pop. 38,000.

Hwang-ho or **HOANG-HO** (Yellow river). One of the two great rivers of China. Rising at an elevation exceeding 2½ m. above sea level in the plateau of Tibet, it flows to the Pacific Ocean through the Nanshan and Minshan mountain ranges. Its strictly mountainous section terminates at Lan-chow in Kansu province, where the bed is less than 1 m. above sea level, and whence it flows N.E., then E., and then S. round the desert plateau of Ordos. Its chief right bank tributary, the Wei-ho, rises

of the river, with its great load of silt that gives it a yellow appearance, has been building up its bed for many centuries until it is considerably higher than the surrounding plain. Embankments have been built to restrain the waters, but there is always the chance that the catastrophe of 1887, when the river burst its banks and drowned a million people, will be repeated. During such times the waters may rise 40 ft. and send a 30-mile-wide flood, 20 or more ft. deep, over the plains.

The Hwang-ho delta extends from Kai-feng to the Gulf of Chih-li and to the Yellow Sea at the old mouth in Kiangsu province. When, in 1938, the Chinese broke the S. dyke in the hope of slowing the advance of the Japanese by flooding the country, the river changed its course again, roughly reverting to the old one into the Yellow Sea. Dyke reinforcement was completed in 1947, when the Central Govt. diverted the river back to its N. course as a military move against the Communists. Between the N. and S.



Hwang-ho. Map of the basin of the great Chinese river which flows through a course of 2,600 miles from the Tibetan plateau to the Pacific Ocean

near the meridian of Lan-chow, and flows E. to join the main stream at the end of the long S.-flowing stretch. Thus the two rivers almost surround a rectangle, 400 m. by 200 m., of which the northern half is one of the driest wastes in the world. From the Wei-ho confluence the course is E. to Kai-feng, on the great plain of N. China, and at the head of the great Hwang-ho delta.

The total course to the mouth in the Gulf of Chih-li is about 2,600 m. Above the Wei-ho confluence the river is of little practical importance, as the valley has a scanty population; in the desert reaches the river frequently changes its bed. The great plain is overlain by deposits of wind-born loess and alluvial mud from the Hwang-ho; the strong current

mouths the hills of the Shantung peninsula prevented a development of tidal mouths and numerous distributaries such as characterise the delta of the Ganges, but since records were first kept by the Chinese the main mouth of the river has shifted seven times in 4,300 years. Here the river is rightly named "China's sorrow," since its vagaries are an ever-present menace. These conditions make the river channels of little use for navigation. The river marks the W. and S. boundary of Shansi prov. and the N. boundary of Ho-nan. Below Lan-chow a stretch of the river is bordered by a section of the Great Wall of China.

Hwiffordd. Welsh name for Haverfordwest (q.v.).

Hyacinth or **JACINTH.** Name once applied to blue stones, later to

reddish-yellow gemstones including zircon, garnet, topaz, idocrase, and ferruginous quartz, and particularly for zircon.

Hyacinth. A hardy bulbous flowering plant of the family Liliaceae. Originally natives of Spain, Switzerland, Italy, and France, they were first introduced to Britain in 1596. Each bulb bears a spike of bell-shaped, sweetly scented flowers in all colours except a good yellow. Hyacinths are grown on a great scale in Holland, and are cultivated by planting in sandy soil during Sept. or Oct.

By choosing early and late varieties, it is possible to have hyacinths in bloom from Dec. until spring. The first to flower are the Roman and the miniature or cynthella hyacinths: if the bulbs are potted in sandy, loamy soil in August and are placed out of doors and covered with old ashes, they will be well rooted in six weeks and should then be brought into a warm greenhouse. If set in bowls of fibre or vases of water in Sept., kept dark until growth begins, and then placed in a room window, hyacinths will bloom in Feb.-March. Hyacinth bulbs are planted out of doors in Oct., 3 ins. deep and 9 ins. apart. The finest spikes of bloom are borne by new, freshly-planted bulbs. Old bulbs will continue to bear small spikes indefinitely.

The wild hyacinth or bluebell (*q.v.*) is *Scilla nutans*.

Hyacinthe, PÈRE (1827-1912). French Carmelite whose name was Charles Jean Marie Loyson. He



Hyacinthe Loyson

was born at Orléans, March 10, 1827, and entered the Carmelite order. He was the most notable preacher of his day in France, and attracted vast crowds to S.

Sulpice and Notre Dame, Paris, denouncing abuses in the Church until in 1869 he was suspended on a charge of indiscipline. He obtained a dispensation from his vows, and for a while acted as a secular priest; but his refusal to submit to the decree of papal infallibility led to his separation from the Roman Church. He associated with the old Catholics,

and married in London in 1872. For some time he served the Old Catholic Church at Geneva, and in 1879 he founded a Gallican Church at Paris. His later years were spent in travelling in the East. He died Feb. 8, 1912.

Hyacinthus (Gr. *Hyakinthos*). In Greek mythology, a beautiful youth beloved of Apollo. He was accidentally killed when playing quoits with the god. From his blood sprang the flower of the same name, though it is doubtful whether the Greek flower was the hyacinth of today. Hyacinthus, like Adonis, represents the spring vegetation which withers away under the heat of the summer sun.



Hyacinth. flower spikes in full bloom

Hyades (Gr. *hyein*, to rain). In Greek mythology, nymphs

who were entrusted by Zeus with the care of the infant Dionysus. They were afterwards placed among the stars as a cluster. The heliacal rising (*q.v.*) of this cluster coincided with the beginning of the rainy season. *Pron.* hy-a-deez.

Hyaena. Family of carnivorous mammals (Hyaenidae). They are now confined to Asia and Africa, though they were common in England in the Stone Age. They are placed by zoologists near the civets. Hyaenas are of ugly and repulsive appearance, with shaggy



Hyaena. Spotted hyaena. Top. Indian striped hyaena. W. S. Berridge, F.Z.S.

hair, broad heads, powerful jaws, sloping backs, and short tails. They are of morose and cowardly character, and live on carrion, though they have been known to attack children, rarely men, and to carry off sheep and calves in times of stress. Three species are recognized, the striped, the spotted and the brown hyaena.

Hyalite (Gr. *hyalos*, glass) or MULLER'S GLASS. A transparent, colourless variety of opal occurring as globular concretions, and crusts with a globular surface. It is less readily dissolved in caustic alkalis than other varieties of opal. *See* Opal.

Hybla. Name of several ancient towns of Sicily. Hybla Major, or Galeatis, on the S. slope of Mt. Etna, was originally a Sicel city, afterwards Hellenised. This is probably the Hybla famed for Hyblaeian honey. Hybla Minor, afterwards known as Megara, is supposed to have stood on the coast near Syracuse. It was destroyed by Gelo of Syracuse in 481 B.C. Hybla Heraea was on the S. coast near Agrigentum (modern Agrigento or Girgenti).

Hybridisation (Lat. *hibrida*, mongrel). Term used loosely in common speech for the breeding together of two distinguishable groups of animals or plants, or for the deliberate mating of any two distinguishably different individuals with the intention of producing a hybrid. Many, but not all, hybrids are sterile, and so can be maintained as a race only by vegetative propagation, as by cuttings, or constantly recruiting the population by fresh hybrid matings of different parents. Many varieties of apple are an example of the former, and mules are an example of the latter method of maintaining a population. In many cases, but not in all, the hybrid is found to be more vigorous than either of its parents, a fact of great practical importance, as for instance in breeding mules for use where neither donkeys nor horses would be of much service. *See* Biology.

Hydatid Disease (Gr. *hydatis*, watery vesicle). Formation of cysts due to infection by the embryos of a parasitic worm. The mature worm *Taenia echinococcus* is less than half an inch in length, and inhabits the intestine of the dog, jackal, and wolf. It consists of a head with four suckers and a double row of from 28 to 50 hooklets, and three or four segments. Man becomes infected either by fondling the infected dog, or

possibly consuming water or meat containing the ova. The embryo bores its way usually into the liver and there causes a cyst to grow. Pressure symptoms or the breaking down of the cyst into a suppurating mass are the commonest results. Removal by surgical operation is the best treatment, but opening and draining the cavity may effect a cure. The disease is rare in Britain, common in Australia and Iceland.

Hyde. Municipal borough and market town of Cheshire, England. It stands on the Tame, 7½ m.

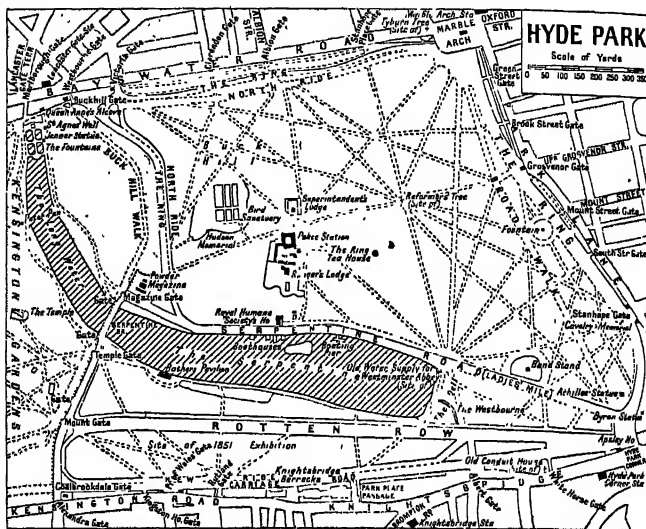


Hyde Arms

E.S.E. of Manchester, and is served by rly. It has cotton mills, iron foundries, engineering works, and factories making gloves, chemicals, and food products. The chief buildings are the public hall, municipal offices, public library, and technical school. Hyde was made a bor. in 1881. Market day, Sat. Pop. (1951) 31,494. Stalybridge and Hyde form a co. constituency.

Hyde, Douglas (1860-1949). Gaelic scholar, president of Éire, 1938-45, known as An Craoibhin Aibhinn (delightful little branch). A Protestant, born Jan. 17, 1860, he was educated at Trinity College, Dublin. President of the Gaelic League from its foundation, 1893, until 1915, in 1906 he presented to it £11,000 earned by lecturing in the U.S.A. He taught languages at the univ. of New Brunswick, 1891-93, was professor of modern Irish at the national university of Ireland, 1909-32, and one of its senate 1909-19. After the promulgation of the constitution of 1937, Hyde was chosen without opposition as first president of Éire by a conference of representatives of Fianna Fáil, the government party, and Fine Gael, the opposition. He did not seek re-election in 1945, and died July 12, 1949. Besides works in Gaelic, he wrote *Story of Early Irish Literature*, 1897; *Literary History of Ireland*, 1899; *Rafferty's Poems*, ed. 1933; *History of Charlemagne*, 1919.

Hyde Park. A London park. Covering 390 acres, it is bounded E. by Park Lane. W. by Kensing-



Hyde Park. Plan showing chief points of interest in London's principal park. Based upon the Ordnance Survey map with the sanction of the Controller of H.M. Stationery Office

ton Gardens, S. by Knightsbridge, and N. by Bayswater Road. It is intersected by footpaths, a road for private vehicles and taxicabs lies round its edge, and it includes the riding track called Rotten Row, and the Serpentine, an artificial lake formed at Queen Caroline's wish, 1730-33, from ponds originally fed by the Westbourne, and crossed by a bridge built by the brothers Rennie in 1828. The lake affords bathing and boating facilities in the summer, skating in severe winters, and is stocked with wild fowl, who find the island, associated with Barrie's Peter Pan, a congenial retreat. Part of its S. shore, set aside in 1930 as a mixed bathing and sunbathing enclosure, received the popular name of Lansbury's Lido, George Lansbury being the commissioner of works who instituted the amenity. In the Serpentine, in 1816, Harriet Westbrook, Shelley's first wife, committed suicide.

Hyde Park Corner is notable for its triple gateway, erected in 1828 from designs by Burton, with reliefs copied from the Elgin marbles. The so-called Achilles statue (*q.v.*) and the Epstein bas-relief of Rima in the bird sanctuary memorial to W. H. Hudson are notable pieces of sculpture. Near the Albert Gate is The Dell, a small sub-tropical garden. The N. section is comparatively treeless, and has formed the scene of many political and other demonstrations, in connexion with one of which, in 1866, about ¼ m. of

the old railings was overthrown by the pressure of the crowd. The annual May Day rally of organized workers takes place here. N.E. of the Ring Tea House, near the site of a circular drive and racecourse of the time of the Stuarts, stood the Reformers' Tree. A 24-hr. guard is still mounted over the powder magazine, lying just N. of the Serpentine bridge. On Sundays and weekday evenings orators of all descriptions are to be heard on the ground near the Marble Arch (*q.v.*). The park was used by the government during the general strike, 1926, as a milk pool and flour store; and an A.A. station was established near Marble Arch during the Second Great War.

The park derives its name from the manor of Hyde, which anciently belonged to the abbey of Westminster. The ground was enclosed and made into a deer park by Henry VIII. Under Charles I it began to be a resort of fashion. During the Civil War it became a camp, afterwards being sold, but its purchasers had to give it up at the Restoration, when the Ring (closed in the reign of George II) became the scene of much frivolity. In 1712 was fought here the famous duel between the duke of Hamilton and Lord Mohun, both being killed. The first great international exhibition was held in the park near Knightsbridge in 1851, the original structure of glass and iron being re-erected at Sydenham as the Crystal Palace (*q.v.*).



Douglas Hyde, President of Éire



Hyderabad. Map of the former state of India, once a princely state

Hyde Park. A homestead in New York state, U.S.A., on the Hudson river. It came to Franklin D. Roosevelt from his father, who had acquired it on retirement from business activities in New York city. Roosevelt was keenly interested in the management of its farms, and greatly appreciated the refreshment that the occupancy of such a house brought him when he was governor of N.Y. state, and later president. In Jan., 1944, he and his wife presented Hyde Park to the U.S. government for use as a national historic site, with the proviso that they and their immediate family could continue to use it during their lifetime. The gift included a valuable library, containing a large number of books, MSS., and other historical material relating to Roosevelt's personal life and political career, and a number of ship models, naval pictures, art objects, and curios. Fifteen months later Roosevelt was buried there.

Hyderabad. District and municipality of West Pakistan in Sind. The district extends E. from the Indus almost to the Thar desert, and is an alluvial plain cultivable only near the river. The soil yields well when irrigated. The city lies E. of the Indus and is a great rly. junction for Delhi to the N.E., Karachi to the S.W., and the Punjab to the N. It is noted for its silks, gold and silver work, and lacquer. Sir James Outram defended the residency against the

Baluchis in 1843. Area of dist. 4,476 sq. m. Pop. (1951) town, 241,801.

Hyderabad. Former state, once a princely state, of India. It was 82,700 sq. m. in area and occupied the centre of the Deccan plateau. It included the major portions of the Godavari and Kistna rivers. As a princely state it was governed by a ruler called a nizam.

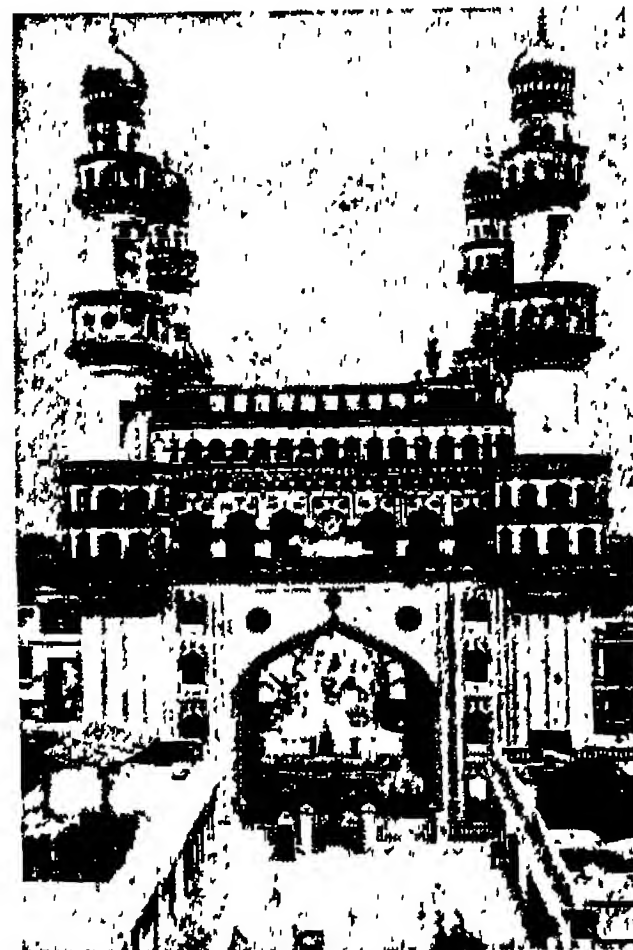
Treaties with the East India co., and later with the British government, established relations between the nizam and the then paramount power. In 1902 the nizam's sovereignty over Berar was reaffirmed, but Berar was leased to the govt. of India in perpetuity on an annual rental of Rs. 25 lacs (£187,500). At the same time the Hyderabad contingent, maintained under agreement ever since 1800, was incorporated into the Indian army. An agreement of 1936 re-affirmed the nizam's sovereignty over Berar, but permitted its administration with the Central Provinces under the Government of India Act, 1935.

Pending the granting of independence to British India, and its division into the Hindu dominion of India and the Muslim dominion of Pakistan, Hyderabad, which had a Muslim ruler and a predominantly Hindu population, declared, June 2, 1947, for complete independence at the lapse of paramountcy. But, after long negotiations and a show of force by the Indian govt., the nizam agreed to

the accession of his state to the dominion of India, Nov. 24, 1949; and in 1950 Hyderabad became one of the states of the Republic of India. In the reorganization of 1956 it was divided between the states of Bombay, Mysore, and Andhra, and Hyderabad state disappeared as an entity.

The former state comprised two natural divisions—Marathwara in the W., Telingana in the E., so called from the principal vernacular spoken in each; Marathi in the W., Telugu in the E. But Kanarese, Hindi, Lambadi, Tamil, Urdu, and other languages were also spoken. Urdu, written in Persian script, was the official language of the state. The chief agricultural products were cotton and wheat in the W., rice and pulses in the E.; minerals included coal, gold, diamonds, and iron, silica, felspar, and other ceramic materials. It was well served by rly., most of the lines belonging to the Nizam's State railway; in the reorganization of the rlys. that followed partition, the Hyderabad rlys. were absorbed in the Eastern and Central rlys. The capital was the city of Hyderabad (*v.i.*) which in 1956 became the capital of Andhra. Secunderabad, the chief rly. centre, was in the days of the British raj the site of an important British cantonment. Pop. (1951) 18,652,964.

Hyderabad. City of India, capital of Andhra state, once capital of the former state of Hyderabad. It comprises Anderun (within the walls), 2 sq. m., and Berun (without the walls), 9½ sq. m. The



Hyderabad. Char Minar, built in 1591, at which structure the four principal streets of the city meet

walls are 6 m. round and the whole city area is 50 sq. m. The city is connected by a short rly. with the great rly. junction at Secunderabad. The Jama Masjid is a copy of the mosque at Mecca. The four principal streets meet at the Char Minar, four minarets built upon four huge arches, formerly a college. In Sept., 1908, floods from the Musi washed away 18,000 houses with considerable loss of life. Pop. (1961) 1,085,722.

Hyder Ali. See the alternative spelling Haider Ali.

Hydnocarpus Oil. A fixed oil yielded by the fresh, ripe seed of *Hydnocarpus wightiana*, a tall Indian tree commonly known to the natives as *kastel* or *kantel*. The oil has been used for many centuries in the treatment of leprosy. The ingredients are chaulmoogric and hydnocarpic acids.

Hydra (Gr., water-serpent). In Greek mythology, a nine-headed monster. It was the offspring of Typhon and Echidna, which dwelt in a swamp near Lerna, in Argos, and ravaged the neighbouring country. The killing of the hydra was one of the twelve labours of Hercules. As often as the hero struck off one of the monster's heads with his club, two others grew in its place. With the help of his servant, Iolaus, Hercules burned away all the heads and buried under a stone the ninth, which was supposed to be immortal.

Hydra. Southern constellation mentioned by Ptolemy. It is the longest constellation in the sky, beginning close to Procyon under Cancer and stretching below the zodiacal constellations of Cancer, Leo, and Virgo, and part of Libra.

Hydra. Small fresh-water polyp common in ponds in Great Britain, where it attaches itself to the weeds. There are three British species, of which the green hydra is the most common. It consists of a little tube, about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. long, with the mouth surrounded by tentacles which have the power of stinging and paralysing the minute creatures on which it feeds.

Hydra. Island of Greece, the ancient Hydraea. It lies off the E. coast of the Morea, about 75 m. S.W. of Athens. The town of Hydra is situated on its N. coast, and formerly had a large trade. Hydra, which is 20 sq. m. in area, gives its name to the channel separating it from the mainland.

Hydrangea. Half-hardy flowering shrubs of the family Saxifragaceae. One species, *H. arborescens*, was introduced into England from N. America in 1736. The

familiar common hydrangea (*H. hortensis*) came from China 54 years later. The flowers grow in large compact heads and for the most part have neither pistil nor stamens, but consist of four petaloid sepals. The perfect flowers are small and grow in the centre of the head. The flowers are naturally white and pink, but by treatment with a solution of saltpetre and oxide of iron blue flowers are produced. Many species thrive in the open air in Great Britain in favoured situations, though generally they require greenhouse treatment.

Hydrant. Pipe, fitted with a valve and an outlet, inserted temporarily or permanently in a water main. The ends of the outlets are screwed so that hose unions can be screwed on. The valves of fire hydrants within a building are usually actuated by hand-wheels. Sometimes the pressure of the mains alone is relied on to propel the water through the hose-line; sometimes a pump is used to boost the pressure.

Street fire hydrants are usually encased in metal surface boxes or in pits below ground, fitted with frost-resisting valves and actuated by lever keys. In another type of hydrant, such as is employed for street watering, the valve is placed below ground and the outlet is extended above ground in a stand-post of convenient height.

Hydrate. Chemical compound formed by the union of molecules of water (H_2O) with other molecules or atoms, without any rearrangement of the atoms of the H_2O group. When the H_2O group is rearranged in the new molecule, the resulting compound is termed a hydroxide.

Hydration. Term denoting the chemical combination of water with some other substance. Many anhydrous silicates combine readily with water and the combination is in general accompanied by expansion of volume and liberation of heat. In aqueous solutions of salts in which the salts break up into ions, hydration includes the combination of one or more ions with one or more molecules of water. Crystalline substances soluble in water may combine with water of crystallisation with formation of hydrates; this pro-

cess is one variety of hydration. The hydrates so formed are called monohydrates, dihydrates, etc.,

according to the number of molecules of water combining with one molecule of the crystalline substance. The energy difference between anhydrous and hydrated compounds is commonly expressed in terms of calories.

Hydrauliclicking.

Method of mining gold, consisting essentially of washing out alluvial gold

and other deposits by means of a powerful jet of water directed against them. This method of gold-mining was first adopted in California about the middle of the 19th century. The gold washed out by hydrauliclicking is recovered by an elaborate series of sluices, riffles, and other devices through which the streams of water, carrying the washed out deposits of gold in suspension, are directed. See Gold; Mining.

Hydraulics (Gr. *hydōr*, water; *aulos*, a pipe). Term with various but related definitions, differing mainly in scope. The widest definition is that it is that branch of science which deals with the laws governing the pressure and flow of fluids, and the application of these laws to engineering practice. The study of behaviour of gases, however, is more commonly classified separately as pneumatics, while hydraulics has been developed to deal with other liquids as well as water. The old subdivision of hydraulics into hydrostatics, dealing with liquids at rest, and hydrodynamics or hydrokinetics, dealing with liquids in motion, is obsolete; but sometimes hydrodynamics is used as the general term with hydraulics restricted to engineering applications.

The most widely accepted current definition represents hydraulics as the study of liquid pressure, buoyancy, flow of liquid, and hydraulic machinery such as pumps, turbines, intensifiers, rams, presses, and accumulators. The ramifications are extremely wide, and in civil engineering alone it has a bearing on the design of such items as canals, dams, barrages, sluices, spillways, locks, and on hydro-electric, irrigation, and sewage-disposal works.

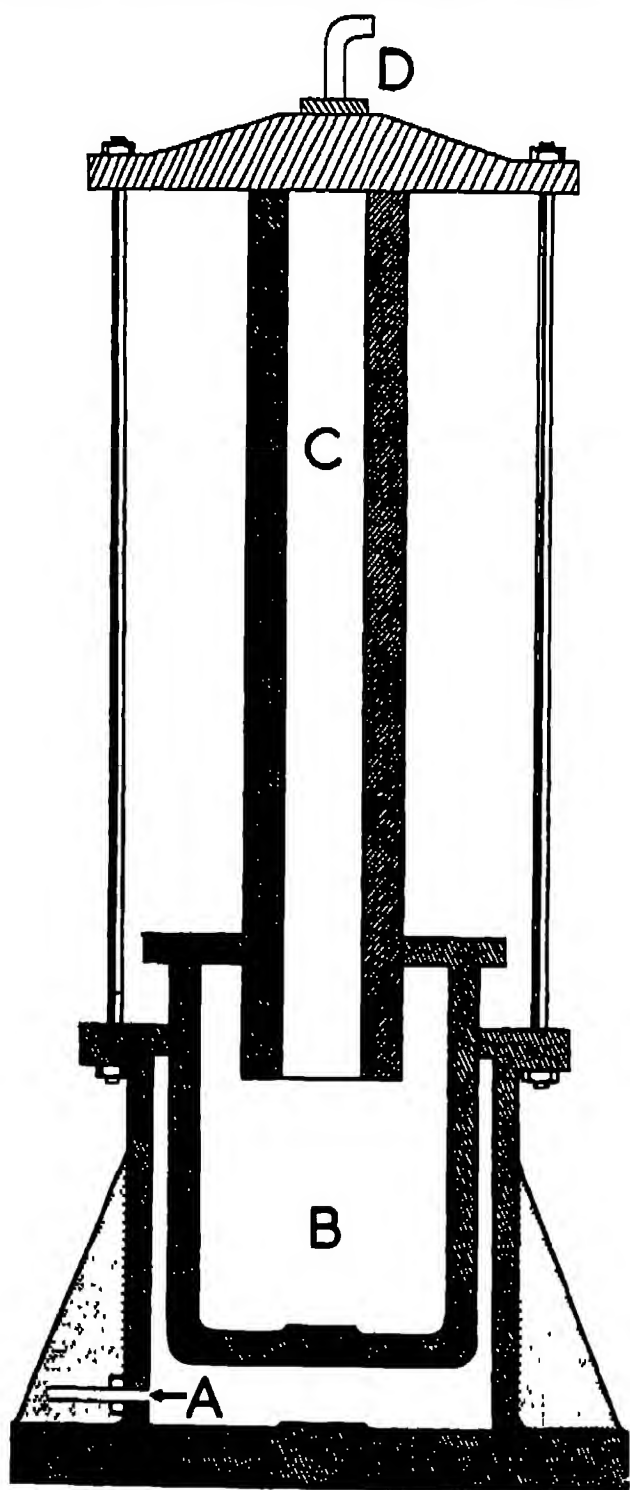
Although the underlying principles and laws of hydraulics can be



Hydrangea. Flower-head of the familiar species, *H. hortensis*

expressed in formulae, there are in practice many divergencies from the ideal theoretical conditions assumed in deriving these equations, and frequently it becomes necessary to introduce empirical correction factors, or to rely on experimental graphs.

An important characteristic of all liquids is that they offer so great a resistance to compression that for many purposes they may be regarded as incompressible, and hence as transmitting pressure without loss. At any point in a liquid the pressure is the same in all directions, *e.g.* the pressure on the bottom of a cylindrical container is equal to the outward pressure on the vertical sides. Fluid pressure is always at right-angles to a surface. With any shaped surface under uniform pressure, the total pressure acting on it in any given direction is the intensity of pressure multiplied by the projected area at right angles.



Hydraulics. Fig. 1. This diagram of an intensifier shows how a comparatively weak initial hydraulic pressure can be increased to operate a machine requiring high hydraulic pressure. Water from the initial supply enters a cylinder at A. This forces up cylinder B, and the water contained in it is in turn forced at high pressure through cylinder C, and so to the machine through outlet D. See text on next page

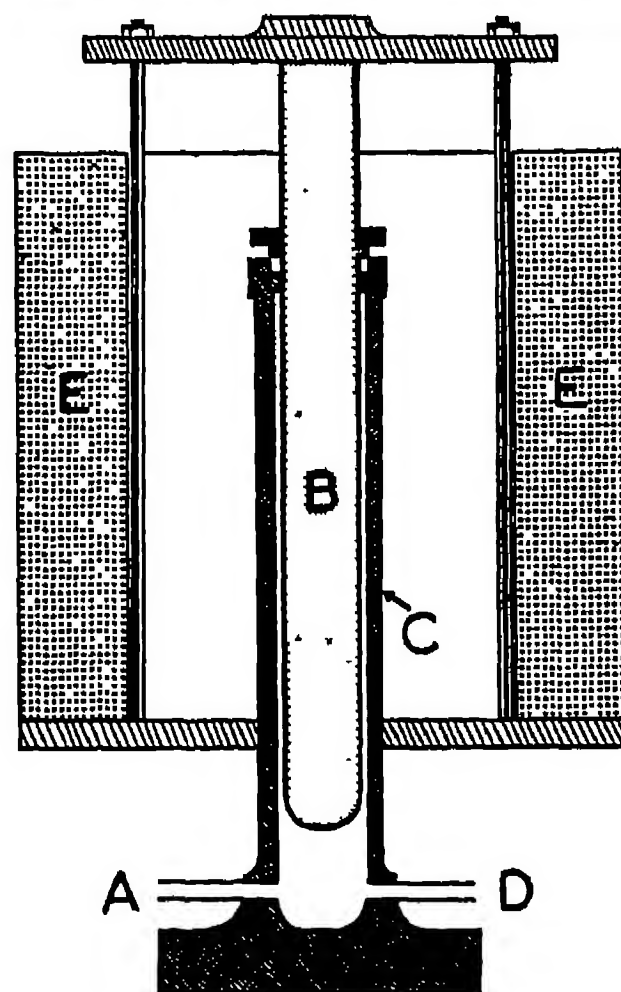
Fluid pressure can be stated in any of the normal engineering or scientific units, such as lb. per sq. in. or dynes per sq. cm., but it is often more convenient to consider it in terms of head. A liquid is subjected to pressure due to its own weight, and this increases with depth. A horizontal area H feet below the surface of a liquid exposed to the atmosphere will be subjected to a head of H feet, or $12 H$ inches, and the area may be considered as supporting a prism whose weight will vary with the liquid concerned. With fresh water a head of one foot is equivalent to 0.433 lb. per sq. in.; with mercury, 5.88 lb. per sq. in.

The total pressure on any immersed plane surface is equal to the area multiplied by the intensity of pressure at the centre of the area. Thus, for a vertical sluice gate 4 ft. square, with its centre 14 ft. below the surface, the total pressure is $0.433 \times 144 \times 16 \times 14$ lb., or approx. 6.24 tons. The pressure increases uniformly from the surface downwards, and it is for this reason that dams are thicker at the base than at the top. If the effect of waves, which may occur when large areas of water are concerned, is left out of account, the water pressure at any depth on a dam wall is independent of volume contained.

Pressure Factors

The pressure at any point in a vertical pipe open at the top and filled with stationary liquid is equal to the atmospheric pressure plus the head of water above the point; and the difference in head between any two points in the pipe is equal to the difference in level between them. If the pipe is bent, the pressure at any point at a given depth below is the same as the pressure at a point on the same level in the straight vertical pipe, and the head would still be equal to the vertical distance of the point from the top of the pipe.

The water from a reservoir situated on a hill can be used to supply the surrounding district, and the static head of water at any place in the district is the vertical depth of that place below the top level of the source of supply. This is the "natural head." When a sufficient natural head is not available, and especially when water at high pressure is required, an artificial head is created by an accumulator pump, or booster (*v.i.*). The static head can be read by a pressure gauge such as a Bourdon gauge or a manometer. When water is flowing



Hydraulics. Fig. 2. This diagram shows in simple outline the principle of the hydraulic accumulator. Water enters the cylinder C at A to raise the ram B. When the cylinder is full, the water supplying it is automatically cut off, and the water in the cylinder is maintained at a constant pressure by the weights E E fixed to either side of the ram. When, by starting any hydraulic machine, water is drawn from the cylinder at D its pressure is maintained constant by the descent of the weighted ram

in a pipe, the gauge gives a lower reading than when liquid is stationary, because some of the head is used up in overcoming the so-called frictional resistance of the pipe and in imparting velocity to the liquid.

The nature of what is conveniently called fluid friction is not precisely known, but it is assumed that the resistance to flow sets up a swirling motion which disturbs the even flow of the liquid. In addition to the resistance offered by the pipe walls, alterations in pipe diameter and bends and fittings offer a form of resistance that can be expressed as equivalent to so many feet of straight pipe.

Bernoulli's Law

The most important general principle relating to the flow of liquid in pipes is that due to Daniel Bernoulli, which states that in any "continuous system" the total head at any point is constant. This head is composed of four parts; the potential head, which is the height of a particle above some convenient datum level; the pressure head, which is the pressure in lb. per sq. in. as read by a pressure gauge, divided by 0.433 (for water); the velocity head, the square of the velocity in

ft. per sec. divided by g (32.2); and functional or resistance head in feet.

For water flowing in very long pipes, most of the initial, or potential, head may be used up in overcoming frictional resistance; when in a uniform pipe, the head will decrease steadily from its maximum, or static, value at one end to zero at the other. For shorter pipes all the various components must be taken into account, and there will usually be a definite velocity of efflux. Engineers' handbooks give a large number of empirical formulae for finding the discharge from a pipe. Each of them gives a somewhat different result; but they are useful for choosing a pipe system that will provide sufficient outflow without using pipes of excessive diameter.

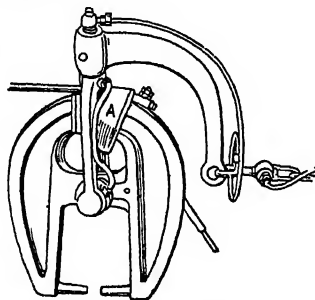
Practical Applications

Many hydraulic machines used in industry depend on the principle of the hydraulic press patented by Joseph Bramah in 1795 (see Bramah Press). Hydraulic presses are used in many different industries for such purposes as forging, flanging, punching, piercing, extruding, drawing, stamping, foundry moulding, die casting, baling, plywood manufacture, vulcanising, and the moulding of plastics. Capacities vary from less than 50 tons up to 15,000 tons or more. The design of the press and the number and type of pump used vary considerably with the duty. Hydraulic rams are also used in extrusion presses for forcing molten or plastic metal and plastics through dies to form rods, tubes, and extruded sections.

Hydraulic riveters are somewhat similar in principle to presses. Portable riveters (Fig. 3), once widely used for riveting steel plates, bridges, girders, and constructional work generally, have been superseded by pneumatic and explosion type riveters. For very heavy work, stationary, or bear type, riveters are still used. Some kinds have two hydraulic rams, one inside the other: the small ram operates an annular tool surrounding the die that squeezes closely together the plates to be riveted; the large one drives the die itself. An auxiliary cylinder and piston bring the tools up to their work and retract them.

Hydraulic jacks may be portable or stationary, and are used for lifting heavy weights. They have a higher efficiency than a screw-jack. The cylinder of the jack may be fixed, the ram rising, or

the jack may be fixed, with the cylinder rising. The top of the jack contains a small hand-operated force pump and valves, a liquid chamber (oil or water, usually the former), and a by-pass for connecting the chamber with the cylinder to lower the jack. Groups of stationary jacks, with power pumps instead of hand plungers, are used to raise large platforms carrying heavy loads—e.g. in hydraulic or dry docks, and motor car inspection jacking platforms.



Hydraulics. Fig. 3. Portable riveter with moving arms. A, cylinder

Even when electricity is available, hydraulic power is often used for opening and closing heavy lock-gates and sluices, and also for opening and slewing certain types of bridge.

Auxiliary Equipment

Hydraulic accumulators (Fig. 2) are used to store water at pressure at times of reduced demand, and to release it when demand exceeds the capacity of pumps. High pressure accumulators are of both weight- and air-loaded types; low pressure accumulators are usually air-loaded, but of different design. The weight-loaded type consists of a long ram operating in a cylinder. From the head of the ram a cross-head supports a load of cast-iron or concrete, or ballast. In the air-loaded type that load is supplied by compressed air from a compressor or an air bottle to a series of steel cylinders into which the water is pumped.

Intensifiers (Fig. 1) are used to boost water pressure for operating machines. One type comprises a fixed ram, through the centre of which high pressure water flows to the machine, and over which slides a hollow ram mounted in a fixed cylinder. Low pressure water admitted into this cylinder forces the sliding ram downwards on to the fixed ram, increasing the pressure inside the former in the ratio of the area of its external end to the area of the

fixed ram. For the return stroke, the fixed cylinder is opened to the exhaust, the valve to the machine is closed, and low pressure water is admitted to the inside of the sliding ram, causing it to rise. High pressure water is thus supplied only during the downward stroke. Double-acting intensifiers give a continuous supply.

Hydraulic brakes in motor cars are well known, and hydraulic power is conveniently applied to other servo-mechanisms, such as the raising and lowering of retractable undercarriages in aircraft, and remote control of guns.

Energy can also be transmitted by longitudinal vibrations through liquid in a pipe line, movements of a plunger at one end being reproduced by a plunger at the other whether the liquid is actually flowing or not. By using a three-phase system with three pipe lines, it is possible to drive a three-cylinder hydraulic motor at the far end. See also Pump; Water Turbine.

Hydrazine OR DI-AMIDOGEN. Colourless liquid that may be regarded as a combination of two amidogen (NH_2) groups. It is a powerful reducing agent, and forms with water a hydrate having powerful alkaline and corrosive properties. Hydrazine is a reduction product of hyponitrous acid.

Hydrazone. Compound formed by the union of substances containing the carbonyl group (CO) with phenylhydrazine. Some hydrazones are used as dyes.

Hydride. Compound of hydrogen with some other element. The principal hydrides are the compounds of hydrogen with carbon called hydrocarbons (*q.v.*). In addition, there are hydrides of lithium, sodium, potassium, calcium, strontium, and barium. Boron forms two hydrides, B_2H_6 and B_4H_{10} . Silicon forms a hydride, silane, SiH_4 , and disilane, Si_2H_6 . There are hydrides of germanium and of tin; there is a hydride of palladium, PdH . There are two hydrides of oxygen, H_2O , water, and H_2O_2 , hydrogen peroxide. There are two hydrides of nitrogen, NH_3 , ammonia gas, and N_2H_4 , hydrazine; and at least three, possibly more, hydrides of phosphorus, the gaseous phosphoretted hydrogen PH_3 , the liquid hydrogen phosphide P_2H_4 , and the solid hydrogen phosphide P_3H_8 .

The hydride of sulphur, H_2S , is sulphuretted hydrogen; selenium and tellurium form hydrides, H_2Se and H_2Te . There are also

hydrides of the halogens, HF, HCl, HBr, HI; of arsenic AsH_3 , etc.

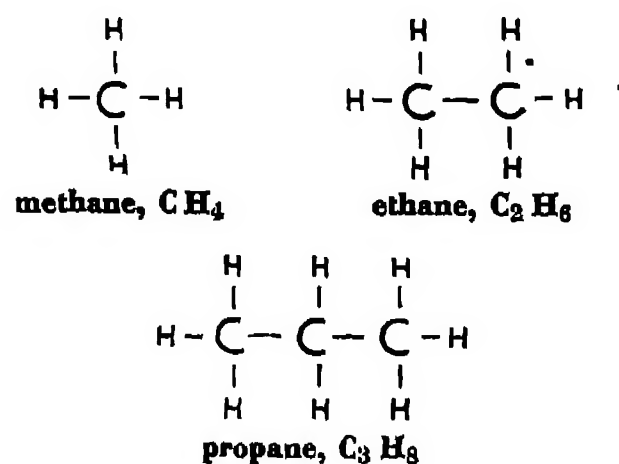
Hydriodic Acid. Acid formed by the solution of hydrogen iodide, HI, in water. Hydrogen iodide is a colourless gas with a suffocating odour; it fumes strongly in air. A 97 p.c. solution (s.g. 1.5) is commonly used in organic chemistry as a reducing agent. The salts, called iodides, include silver iodide used in photography, and potassium, sodium, and mercuric iodides used in medicine.

Hydrobromic Acid. Acid formed by the solution of hydrogen bromide, HBr, in water. Hydrogen bromide is a colourless gas with an irritating odour; it fumes in air. Salts of the acid include silver bromide used in photography, and potassium bromide (also sodium, ammonium, and lithium bromides) used in medicine.

Hydrocarbons. Compounds of carbon and hydrogen only. Complicated mixtures of them occur naturally as petroleum (*q.v.*), and similar mixtures can be derived from coal by various processes of distillation, hydrogenation (*q.v.*), and catalytic synthesis. The hydrocarbons provide the most concentrated stores of chemical energy available in any considerable scale in the world, and since they are all derived ultimately from living processes, the original source of that energy must in all of them have been the sun's radiation.

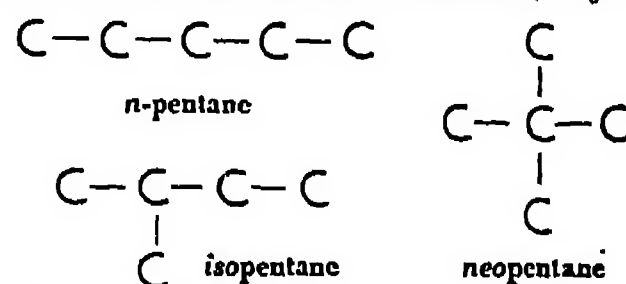
Carbon, with a valency of 4, is unique among the elements in having atoms that will unite with each other in long chains and branched patterns (forming aliphatic compounds), and in rings and networks (forming aromatic compounds).

Among the aliphatic hydrocarbons, the paraffin series has a carbon skeleton in which the atoms are joined by single bonds, and all the remaining carbon valencies are taken up by hydrogen atoms, giving the general formula $\text{C}_n\text{H}_{2n+2}$. Thus:



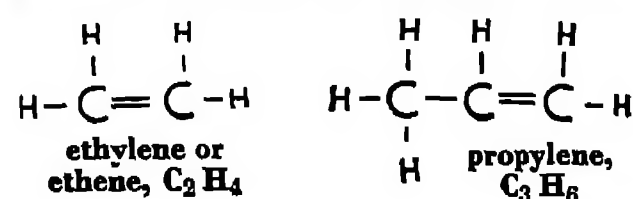
Similarly for butane, C_4H_{10} ; pentane, C_5H_{12} ; hexane, C_6H_{14} ; heptane, C_7H_{16} ; octane, C_8H_{18} , etc. Compounds in which the

chain is straight are distinguished by the prefix *n*- for normal; those with one branch, by *iso*-; those with two branches, by *neo*-. The different substances thus formed are called structural isomers; *e.g.*:



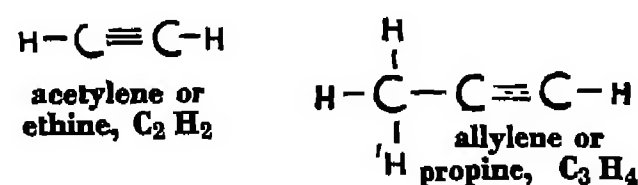
The number of hydrogen atoms attached to each of these skeletons is the same (twelve).

In the olefin series there is one double bond, and consequently two hydrogen atoms fewer than in the corresponding paraffin. The general formula is C_nH_{2n} . Thus:



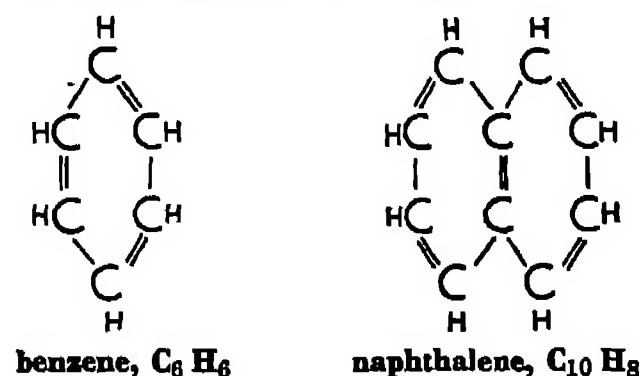
Similarly for the butylenes or butenes, C_4H_8 , etc.

In the acetylene series there is a triple band, with the general formula $\text{C}_n\text{H}_{2n-2}$.

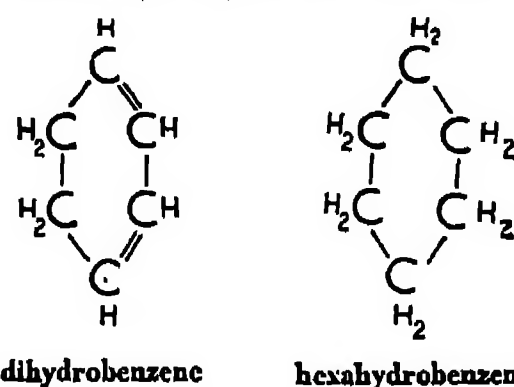


Similarly for the crotonylenes or butynes, C_4H_6 , etc.

Aromatic compounds have the carbon atoms arranged in rings, usually represented thus:



Experimentally no difference can be detected between single and double bonds in the ring, and it is generally understood that the electrons which form them must somehow be evenly distributed round the ring. If, however, the system is broken by the addition of more hydrogen atoms, *e.g.*:

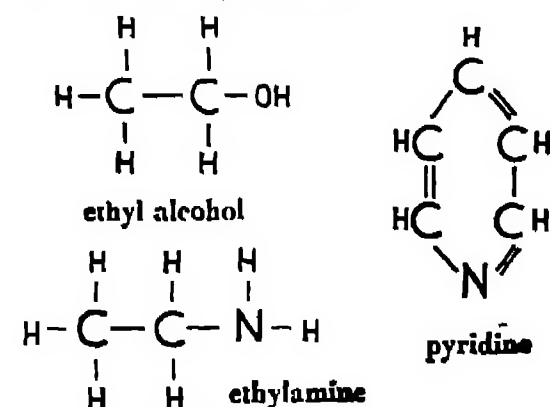


the compound loses its aromatic character and is called alicyclic.

Cycloparaffins may have rings containing anything from three to thirty carbon atoms in the ring. Those found in petroleum (naphthenes) usually have five or six.

The members of each series are called homologues and show a regular gradation of physical and chemical properties. Up to butane, for instance, the paraffins are gases at room temperatures; from pentane on they are liquids with successively higher melting and boiling points; the higher homologues in paraffin wax (with from 20 to 30 carbon atoms) are solids.

Since the hydrocarbons are the simplest of the organic substances, it is often convenient to look on other organic molecules as derived from them by the substitution of some other atom or group of atoms for one or more of the hydrogen or carbon atoms, thus:



Comparable substitutions characterise the various series of organic substances, such as alcohols, aldehydes, ketones, fatty acids.

Hydrocele. Term for a condition in which the sac containing the testes fills with fluid. This may be due to mechanical obstruction, possibly following injury, or may result from a pathological condition such as late syphilis, or from back pressure on the portal circulation due to cirrhosis of the liver. It is often necessary for the fluid to be drawn off by the surgeon while the basic condition is treated.

Hydrocephalus (Greek *hydōr*, water; *kephalē*, head). Condition commonly called water on the brain, due to an excess of the fluid normally in the cavities (ventricles) of the brain. It may be the result of defects present at birth, often associated with congenital syphilis or with consanguinity of the parents; or of inflammation causing pressure on the cerebral blood vessels, when no age is immune. In the child the head gradually enlarges, the forehead bulges, and the patient cannot lift the head from the pillow. Operative treatment is unsuccessful.

Hydrocharitaceae. A family of aquatic herbs, mostly with floating or submerged leaves. The sexes are usually in separate

flowers, which have three sepals and three petals; the fruit is usually a submerged berry. The family, which includes *e.g.* Canadian pondweed and frogbit, is represented in all climates.

Hydrochloric Acid or MURIATIC ACID. Liquid prepared by dissolving hydrogen chloride, HCl, in water, known since the days of the Arabian alchemists. Its preparation was first clearly described by Glauber in 1648. Hydrogen chloride is the only known compound of hydrogen and chlorine, and it can be made by the direct union of these elements, equal volumes of these gases mixed and exposed to light combining with explosive violence. It can also be made by heating common salt and sulphuric acid together.

The acid is still made on a limited scale as a by-product in the preparation of soda ash. In this process salt is heated with sulphuric acid in large iron pans and the hydrogen chloride, which is produced in quantity, is conducted into tall towers filled with coke through which water is allowed to trickle. The gas dissolves in the water and forms the commercial hydrochloric acid used for producing chlorine and preparing chlorides. Very pure hydrochloric acid is made by combustion of hydrogen and chlorine, formed as by-products in caustic soda manufacture by the electrolytic process.

Hydrochloric acid is an important constituent of the gastric juice, and in medicine is given in suitable doses to remedy a deficient natural provision: many cases of gastric indigestion, loss of appetite, and flatulence formerly treated with soothing alkalis are now recognized as due to failure of secretion of hydrochloric acid.

Strong hydrochloric acid is a powerful poison, a teaspoonful having proved sufficient to cause death. The symptoms are immediate intense burning pain in the mouth and stomach, followed by violent vomiting and retching; coughing, hoarseness of the voice, and difficulty in breathing may also occur if the fumes of the acid have been inhaled into the lungs. The pain spreads over the whole abdomen, shock supervenes, the pulse becoming small and the skin cold and clammy, and, when a large dose has been taken, death follows in a few hours.

Calcined magnesia, if it is available, is the best antidote, but sodium bicarbonate, chalk, plaster from the ceiling, or whiting may be

given powdered in water. If none of these substances is at hand, large draughts of water should be given in order to dilute the acid.

Hydrocyanic Acid (Gr. *hydōr*, water; *kyanos*, blue) (HCN). A poisonous liquid with a characteristic smell resembling that of bitter almonds, and popularly known as prussic acid. It was discovered by Scheele in 1782, who prepared it by decomposing potassium ferrocyanide by means of sulphuric acid. The acid is produced by distilling potassium or sodium cyanide with dilute sulphuric acid or by passing electric discharges through a mixture of acetylene and hydrogen. Hydrocyanic acid is widely used as a fumigant.

The concentrated acid is readily inflammable and burns with a beautiful violet flame. It is one of the most powerful and rapid of known poisons, and even with dilute solutions fatal results rapidly follow. Half a teaspoonful of the two p.c. solution of the acid, and five grains of potassium cyanide, have been sufficient to cause death. The symptoms come on immediately the poison is taken. The person may be able to run to the door or cry for assistance, but often he is unable to do this and falls to the ground in a state of unconsciousness, frequently after

uttering a piercing shriek. Breathing becomes difficult, the skin purplish, and the lips may be covered with froth; the eyes are staring and glistening; the skin cold and clammy and the pulse almost imperceptible. Vomiting and convulsions may occur. The breathing gradually becomes more laboured and slower, and death eventually occurs from collapse.

Treatment, if the rapid and definite action of the poison allows time for any, consists in the prompt use of the stomach tube or administration of an emetic. Pending the arrival of a doctor, the patient should be given large doses of salt and water or mustard and water. Respiration should be stimulated by holding ammonia to the nostrils and by throwing cold water over the face. The application of a faradic current over the chest has also been recommended. Artificial respiration may be necessary.

Dilute HCN is used in medicine in small doses in combination with such other drugs as opium and bismuth as an intestinal sedative.

Hydrodynamics. Science which treats of the motions and equilibrium of fluids. The subject is treated under its separate sections Hydrokinetics and Hydrostatics.

HYDRO-ELECTRIC INSTALLATIONS

J. Kennard, M.I.C.E.

A survey of world development in the use of water power for the generation of electricity. Related aspects of the subject are dealt with under Electric Power; Grid; Irrigation; Turbine. See also illustrated articles dealing with individual dams, e.g. Dnieper Dam; Grand Coulee Dam; Hoover Dam

A hydro-electric installation comprises works designed to harness the power of flowing water falling from a height, and to convert this power into electricity. From the time of its conception to its successful completion it demands the highest skill and ingenuity of civil, mechanical, and electrical engineers. The underlying principle is the same when a small installation is constructed for the supply of lighting to a single house, or to operate the machinery of a small workshop, as it is where perhaps a million h.p. or more of hydro-electric power is produced, and many engineering feats have been accomplished to take advantage on a large scale of the energy freely supplied by nature.

Before electricity was discovered, the power of flowing water was used to turn a wheel and thereby to drive a mill. Such

water wheels are still commonly found in operation, particularly where electricity is not available. Operation is cheap and maintenance negligible. The disadvantage of the simple water wheel is that its power cannot be stored, nor can it be economically distributed or applied at any distance from its point of production. By making the water wheel drive a dynamo, or, better still, by diverting the flowing water under pressure to a turbine, electricity can be generated.

The function of the civil engineer is to select the site where the electric power can be produced most economically. Almost invariably the scheme involves the construction of a storage reservoir, to equalise the flow of the river. In other words, some of the large flows and floods of the rainy season have to be conserved so that the (probably inadequate)

quantity of water available in the dry season can be increased. A study of the flow records over as long a period as possible is necessary, and a survey of the river valley must be carried out to enable the engineer to determine the optimum size of the reservoir required, the height of the dam, and the most favourable route and gradient of the aqueduct for conveying the water to the power station. Before detailed designs of the structural work are prepared, a geological investigation is generally undertaken.

Rate and Height of Water Flow

The two principal factors in the determination of the potential power available from any hydro-electric scheme are the average rate of flow of the water and the height through which it is allowed to fall before entering the turbines. Neglecting friction losses, the product of these two factors gives the water horse power (w.h.p.) and the relationship can be simply expressed by the fact that a flow of 1,000,000 gallons per day falling 100 ft. is equivalent to 21 w.h.p. The conversion of this power into electrical energy introduces further losses because hydraulic and other machinery can never be manufactured with an efficiency of 100 p.c.; further, ignoring the efficiency factor, 1 h.p. is convertible to 0.746 kW. If the demand for current is constant throughout the year, and corresponds to the maximum output of the plant, the station is said to have a load factor of 100 p.c.; but usually the number of kilowatt-hours generated in a year is substantially less than the maximum output of the station throughout the year, and this results in a much lower load factor. For the production of metals, for example, a water power scheme which produces complete regulation of flows, so that the power station can be operated throughout the year on a 100 p.c. load factor, is probably the ideal arrangement; but is not necessarily the most economical on the basis of cost per unit of power produced. An alternative, particularly where a varying output of power, and therefore of metal, is to be avoided, is partial regulation of the flow by means of small reservoirs, to provide the base load; supplemented, when the water supply is deficient, by power from oil or steam plant. One great advantage of hydro-electric power compared with steam power, is that in a fully

developed water power scheme, so long as the whole of the energy provided can be absorbed by the system load, the average load factor remains constant, since it is a function only of the installed capacity and the average run-off from the drainage area.

If a water power plant is worked continuously the quantity of water drawn from the reservoirs is constant, and the aqueducts are of minimum cross section and therefore of least cost. Similarly, the power house with its foundations, tail race, and plant is of minimum and most economical size. By reducing the load factor to 50 p.c. the average load is doubled for half the time, and consequently the same works must be doubled in capacity, which materially affects the cost per unit of electricity generated.

At some installations the demand for power fluctuates so much that the demand during peak load hours must be met by the introduction of high-level storage reservoirs. Making use of the surplus energy produced during periods of low demand, water is pumped into the reservoirs, and is subsequently released through turbines to drive electric generators, thereby increasing the capacity of the installation. A number of such plants are in use on the Continent, the first having been built at Zürich in 1882.

Economics of the Installation

The successful development of a hydro-electric installation depends on the net cost at which it can produce electricity. There is such a diversity of factors that no generalisation can be made. The only test is to take the cost of power from an individual site developed to its economic limit and to compare it with the cost of steam power to serve the same market. The general view is that water power, based upon a non-wasting source of energy, costs little beyond capital expenditure.

The cost per unit of electricity generated by any power plant is made up of four items: (a) interest on capital expenditure; (b) sinking fund to amortise the capital; (c) maintenance; (d) operating expenses. In the steam plant the operating expenses include the cost of fuel, and are therefore very much higher than in the hydro-electric plant, of which the operating cost per unit of electricity generated is almost negligible, interest charges forming the major portion of the all-in cost per unit.

Apart from the purely economic aspect, the requirements of the state, particularly from the point of view of national security, must not be disregarded. The First Great War was declared just when the first two plants for the manufacture of synthetic ammonia were in operation in Germany, and during that war three further plants were developed. When the Second Great War broke out, Germany was operating synthetic rubber plants, without which she would probably have been unable to conduct a mechanised war for long. It is doubtful whether Germany could have manufactured either product without her water power supplies.

Production of Metals

Considerable electric power is necessary for the production of metals. According to Sir William Halcrow, a leading British engineer responsible for several important hydro-electric installations in the Scottish Highlands, aluminium requires about 20,000 kWh. (B.Th.U.) per ton—excluding the power required for the mining of the ore. Magnesium also requires 20,000 kWh., zinc 3,500 kWh., and copper 250 kWh. per ton. A plentiful supply of cheap power, not only for operating the electric furnaces, but also for extracting ore from the earth, is thus a vital factor in reducing the cost of production, and the availability of the raw materials within a reasonable distance of the generated power becomes an important consideration. In the production of aluminium, for example, one ton of metal is produced from about 15 tons of raw material.

Electro-metallurgical industries served by water power have been particularly developed in the U.S.A. and in parts of the British Commonwealth. Over 21,000,000 h.p. of hydro-electric power, or about one-third of potential water power, has already been developed in the U.S.A., where many of the schemes are also built for water supply and river regulation. In Canada the development of water power has resulted in that country's becoming of outstanding industrial importance. Over 10,000,000 h.p. is generated, used in the pulp and paper industry, and in the operation of mines, electro-chemical and electro-metallurgical industries, rlys., etc.

Output of electricity from water power in Norway and Sweden is over 5,000,000 h.p.; 85 p.c. of all transport on the state rlys. is elec-

trical, and the large industries, almost without exception, use hydro-electric power. The Swedish plants have been designed and constructed with a high standard of artistic beauty. The Odda works in Norway were in operation before the First Great War, and provide some 400,000 h.p. for several important chemical works. The production of calcium cyanamide, an important fertiliser (*see Calcium*), consumes a considerable amount of electrical energy.

Italy has also greatly developed its hydro-electric resources. In France in 1951 some 56 p.c. of the electrical power produced came from hydro-electric stations. Much power is used in the electro-metallurgical industries, particularly in the Alps and the Pyrenees, where melted snow in summer and rain in autumn provide large volumes of water. Over 2,500 m. of railway track were electrified by 1950, and electrification of the Paris to Marseilles line, with branches to Geneva and Caloz, was planned for completion by 1955.

A great dam and hydro-electric station at Genissiat on the upper Rhône was opened in 1948; another was opened in 1952 at Donzère-Mondragon, on the lower Rhône between Montélimar and Avignon, this marking completion of the second stage in a plan for using the waters of the Rhône to generate 2,000,000 kW., envisaging an annual output of nearly 14,000,000 kWh. It was intended to construct eventually 20 hydro-electric stations along the whole length of the Rhône from the Swiss frontier to the Mediterranean.

Installations in Spain

Mountainous Spain, with numerous waterfalls harnessed since the beginning of the century, has nearly 400 hydro-electric installations. The Douro waterfalls, near the frontier between Spain and Portugal, have been tapped in one of the boldest and most interesting projects, permitting the formation of a lake nearly 58 m. long, and having a capacity of 6,000,000,000 kWh., or nearly two-thirds of the potential hydro-electric production of the country.

In Switzerland the major part of a considerable number of water power schemes is devoted to the supply of light, heat, and power to the people. Some 95 p.c. of the houses have electricity. The Rlys. also use much of Switzerland's 4,000,000 h.p. of hydro-electricity, very few steam trains being in operation now.

The potential power of Germany is in the region of 7,000,000 h.p., but this is insufficient to meet more than a small proportion of its industrial demands, and consequently many steam plants are used in addition. Russia has a very large potential output, though up to the outbreak of the Second Great War only 5 to 10 p.c.—over 30,000,000 h.p.—had been actually developed.

In the U.S.A. one of the most important schemes developed is the Tennessee Valley Authority (T.V.A.), constituted in 1933, which not only deals with the water power of the Tennessee river, but also with flood control and navigation, re-afforestation

towns; another plant pumps water from the river for domestic and industrial purposes over a considerable area. The development of this scheme necessitated the construction of the famous Hoover dam.

In Great Britain the principal installations are in the Highlands of Scotland, and plans have been made for installations in N. Wales; elsewhere the country does not lend itself to the production of hydro-electric power. In Scotland, the Galloway works, completed in 1934, capacity approximately 120,000 kW., not only provided electricity for the surrounding area but also made available a major part of its output to the



Hydro-Electric Installations. General view of the Carsfad works, part of the Galloway scheme in Scotland

and the fullest use of marginal lands, agricultural and industrial development, and national defence by operating the Muscle Shoals chemical plant, where both concentrated phosphates and explosives are manufactured. The total power capacity of the scheme exceeds two million kW., and brings the T.V.A. to second place in the U.S. electric system. (*See Tennessee Valley Authority.*)

The hydro-electric installation on the Colorado river, U.S.A., is the largest of its kind in the world. The capacity of the plant installed is 1,835,000 h.p., consisting of 15 main generating units rated at 82,500 kW. each, and two others each of 40,000 kW. capacity. A large proportion of this immense power is transmitted at very high voltage some 200 m. to the city of Los Angeles on the Pacific, and to other large

central electricity authority for use in Clydeside and Merseyside. Nine dams were built, in height from 35 to 86 ft., and five power stations. Because of the importance of the Dee and the Don as salmon rivers, fish-passes or ladders were constructed at the dams to enable the salmon to make their way upstream. An earlier (1926) and notable hydro-electric undertaking is at Lochaber (*q.v.*).

As a result of the Electricity Act of 1947, which nationalised Great Britain's electricity supply industry, the North of Scotland hydro-electric board (*see Highland Development Scheme*) became responsible for the undertakings of 15 local authorities and companies, including the stations at Rannoch (48,000 kW.), Tummel (34,000 kW.), and Luichart (2,750 kW.).

It is believed that the potential output of Highland water power

is 10,000,000,000 kWh. per annum. Up to 1953, the production of the board had reached over 900,000,000 kWh., compared with 320,000,000 in 1939.

Included in recent schemes is the largest individual hydro-electric station, at Loch Sloy, 130,000 kW., estimated annual output between 115,000,000 and 120,000,000 kWh. The Sloy dam is the highest in Scotland. It is 168 ft. from base to spillway, and 1,160 ft. long. Also, it is the first buttress type dam to be built in Great Britain. The Glen Affric works (66,000 kW.) have the most massive dam in Scotland, 2,385 ft. long, 116 ft. high. And it has the generating station with the highest average annual output: 223,000,000 kWh.

The Fannich works (24,000 kW.), with estimated annual output of 83,000,000 kWh., were the first stage in the development of the waters of the River Conon, to be tapped eventually by six stations with a total annual output of about 437,000,000 kWh. Two large schemes in course of promotion included the Breadalbane, estimated total annual output 304,000,000 kWh., to have seven stations with total capacity of 88,500 kW.; and the Shin, estimated annual output 168,000,000 kWh., to have six stations with total capacity of 44,000 kW.

The board was also engaged in the construction of a Highland grid to connect the new power stations with one another, with centres of distribution in the North, and with the British Electricity Authority's grid in central Scotland. The grid system already comprised over 1,000 circuit miles of 132,000 volt lines. Up to 1953 the board was supplying 281,000 consumers, of whom over 92,000 had been connected to the mains since 1948; and 367 villages, hamlets, and new housing areas had been supplied for the first time.

The Dnieper Scheme

Construction of the Dnieper river (Dniestrovoi) hydro-electric works in S. Russia, completed in 1932, damaged during the Second Great War, and subsequently repaired, involved the highest engineering skill. The turbines generate about half a million horse-power, and part of it is consumed by the large factories constructed along the banks of the river. The rest of the power is transmitted by high voltage lines to more distant industrial regions. In addition, the building of the dam raised the

water level over certain shallow portions of the Dnieper river by 120 ft., rendering it navigable for hundreds of miles up from the Black Sea, and transformed the Ukraine into one of the most productive industrial and agricultural areas of the Soviet Union.

There are still enormous untapped resources of water power all over the world, and Sir W. Halcrow has estimated that in the British Commonwealth alone over 100,000,000 h.p. (of which only 6 p.c. has been developed) could be made available, as follows:

Country	Potential
Canada	34,400,000
Honduras	1,000,000
West Indies	150,000
British Guiana	2,500,000
Gold Coast	1,450,000
Sierra Leone	1,700,000
Union of S. Africa and S.W. Africa	1,750,000
Nigeria	9,000,000
Rhodesia	2,500,000
Tanganyika	2,700,000
British E. Africa and British Central Africa	5,900,000
Bechuanaland	200,000
India, Pakistan, and Ceylon	27,168,000
Malaya	4,000,000
Australia, New Zealand, and Tasmania	3,800,000
Borneo, New Guinea, and Papua	7,500,000

But it is unlikely that all this power will ever be harnessed.

TIDAL POWER. This is the power available from the flow and ebb of the sea tides. The problem of harnessing it is in many respects related to that of harnessing flowing inland water. For many years engineers have been considering ways and means of utilising tidal power successfully; tide mills were, in fact, in operation at the beginning of the 19th cent. The general principle is to construct a barrage across an estuary in such a manner that water flows into an enclosed area through openings, which are closed at high tide. When the tide falls, the difference in level between the impounded water and the sea below the barrage is utilised to drive turbines. This is single tide working; double tide working implies the development of power by the rising as well as the falling tide. Allowance must be made for the variation of power output due to the fall of the tide twice a day and the advance by one hour daily of the time of high tide.

A large rise and fall of tide, and a suitable impounding area, provide the best conditions for tidal power works, and special attention has been devoted to the possibility of harnessing the power of the River Severn. In 1945 a committee appointed by

the minister of Fuel and Power reported that the reef called English Stones was a suitable site for a barrage, operation being by single tide working. At spring tides the maximum power available was estimated to be 800,000 kW. The average annual output of energy would be 2,190 million kWh. which could be used economically in conjunction with existing and new fuel-fired power stations connected to the grid. The estimated capital cost of the works was nearly £50 million, whilst the estimated average saving in coal for the first fifteen years of operation was 988,000 tons per annum.

Hydro-Extractor OR CENTRIFUGAL DRIER. Machine which uses centrifugal force to remove water or other liquid from yarns, cloth, clothes being laundered, sugar, etc. The materials to be dried or separated are placed in a perforated inner drum revolving at high speed within a stationary casing. The whirling action causes the heavier substance (*e.g.* water from clothing, or syrup from sugar crystals) to be thrown off, and it passes out through interstices in the drum. In laundry work the hydro-extractor has replaced the wringer in expressing water from clothes. The machine is illustrated under Laundry. Centrifugal extractors are used in industry for preparing or separating all kinds of substances.

Hydrofluoric Acid. A highly corrosive acid which results from the solution of hydrogen fluoride, HF, in water. Hydrogen fluoride is a colourless, strongly fuming liquid boiling at 19.4° C., which though highly reactive is not itself an acid, and does not conduct electricity.

Hydrofluoric acid is usually made by the decomposition of fluorspar in strong sulphuric acid. The vessels used for the process must be of lead or platinum, as the acid attacks earthenware and glass. It is usually stored in gutta-percha bottles, or in glass bottles lined with paraffin wax. Its chief use is for etching glass by the action of the acid on the silica in the glass: the glass is coated with wax, the lines to be etched are scratched with a metal point, and the glass is exposed to the action of the acid.

Hydrofluosilic Acid OR SILICO-FLUORIC ACID (H_2SiF_6). Corrosive compound formed by leading silicon tetrafluoride into water. Silicon tetrafluoride is prepared by heating in a stoneware vessel fluorspar and sand or powdered glass mixed

with sulphuric acid. The acid is sometimes employed as a test for potassium salts, and fluosilicates have been used as antiseptics.

Hydrogen (Gr. *hydōr*, water; *gen*, to generate) (H). The simplest chemical element and the lightest known gas. Hydrogen has been liquefied and solidified; its melting point is -259°C . and boiling point -252.8° . It is colourless and only slightly soluble in water. It was first investigated in 1766, by Cavendish, who called it inflammable air. It has the atomic weight of 1.0080, and exists as a mixture of isotopes: (1) ordinary hydrogen, 99.98 p.c.; (2) heavy hydrogen or deuterium (atomic weight 2) 0.02 p.c.; (3) traces of a heavier radio-active isotope (atomic weight 3) called tritium. Hydrogen is contained in coal gas and in petroleum; it is conveniently prepared on a small scale by the action of an acid on iron or zinc. On the large scale it is prepared by the electrolysis of water and by the catalysis of water gas using a catalyst of iron containing various other metallic oxides.

Universal Distribution

Hydrogen is contained in the atmosphere of the sun and many stars, and it forms an essential element in every acid. It is also contained in all the carbohydrates and in thousands of other organic compounds. It enters into the hydrogenation of fats.

The atom of hydrogen consists of one proton (*g.v.*) and one external electron, two such atoms combining to make one molecule of hydrogen. Theoretical considerations tend to prove that each hydrogen atom is spinning in space, some spinning in one direction, others in the contrary direction. In the molecule the two atoms may be spinning in the same direction or in opposite directions, and consequently there are two varieties of the hydrogen molecule. When the two atoms spin in the same direction the molecule is called orthohydrogen; when in opposing directions, the molecule is called parahydrogen; the parahydrogen appears to be more stable at very low temperatures. Slight differences in melting points and vapour pressures of the two varieties have been recorded. *See* Deuterium; Heavy Hydrogen; Hydride; Hydrocarbon.

Hydrogenation. Term for the process by which hydrogen is combined with a substance, used in particular of such combination with coal, tar, oil, and other carbonaceous materials. The treat-

ment is carried out in the presence of a catalyst at high temperatures (400 – 500°C .) and high pressures of hydrogen (200 – 700 atmospheres) and normally results in the addition of hydrogen, the removal of combined oxygen, nitrogen, and sulphur as water, ammonia, and hydrogen sulphide, and the breakdown of the raw material into substances of lower molecular weight. The main product of hydrogenation is high-grade motor spirit or aviation spirit; others are fuel oil, diesel oil, lubricating oil, and hydrocarbon gases.

First Commercial Plant at Leuna

Experiments were carried out in Germany in the early years of the 20th cent. by F. Bergius. The first commercial hydrogenation plant was set up in 1927 at Leuna, Germany, for the treatment of brown coal. Bituminous coal was used in experiments in Great Britain.

In the process used at Leuna, brown coal with about 4 p.c. of an iron oxide catalyst is dried, powdered, and made into a paste with an approximately equal quantity of heavy oil obtained from the process. The paste is then pumped with hydrogen to the plant at a pressure of 230 atmospheres. After passing through a heat interchanger and a preheater, the reactants enter the first converter at a temperature of 430°C . which is raised rapidly by the heat of reaction to 490°C .; this temperature is maintained by the introduction of cold hydrogen at suitable points. The liquid products from this first or liquid-phase stage of coal hydrogenation are then separated by means of distillation into heavy oil (boiling above 325°C .), middle oil (boiling 180 – 325°C .), and spirit (petrol). The heavy oil is used at the earlier stage of the process to make the powdered coal into a paste. The middle oil (sometimes with the spirit) is hydrogenated over a bed of fixed catalyst in the vapour-phase process, usually carried out at 300 atmospheres in two stages.

In the first stage (saturation) the catalyst is pelleted tungsten sulphide, and the oil is treated at 400 – 410°C . for the removal of oxygen, sulphur, and particularly nitrogen which has a deleterious effect in the second stage (splitting). The product from saturation, after distillation if necessary to remove spirit, is treated at 400 – 410°C . in the splitting stage over a catalyst consisting of tungsten sulphide (10 p.c.) supported on activated earth; the oil obtained is distilled to yield

spirit as a main product, and residual middle oil is put through the process again. For the hydrogenation of brown coal tar, the tar is distilled, and heavy oil boiling above 325°C . is treated in the liquid phase, while middle oil from this treatment, together with the distillate from the tar, is treated in the two-stage vapour-phase process. Tar distillates, such as cresotene, are treated directly in the two stage vapour-phase process, while petroleum oils substantially free from nitrogen can be treated solely by vapour-phase splitting hydrogenation.

The hydrogenation of bituminous coal is more difficult; it is done by a similar process using a pressure of 300 atmospheres, a reaction temperature of 460 – 470°C ., and a more active catalyst (tin oxalate and ammonium chloride) in the liquid phase. During the Second Great War Germany achieved a slightly improved conversion to oil by operation at 700 atmospheres and 470 – 480°C . using a simpler and more readily available iron catalyst. Similarly the 700-atmospheres liquid-phase process with a reaction temperature of 480°C . was used for the treatment of pitch and heavy oil from bituminous coal tar, and heavy petroleum residues.

Yield of Motor Spirit

The yield of motor spirit is generally about 60 p.c. from bituminous coal (calculated on an ash- and moisture-free basis), and 80–90 p.c. from bituminous coal tar. The consumption of hydrogen is about 15 p.c. by wt. of the ash- and moisture-free coal. Additional coal is required for power and hydrogen production, and the consumption of coal to produce 1 ton of spirit is about 5 tons.

The quality of the products depends on the nature of the raw material and the treatment. The hydrogenation of bituminous coal in Germany gave aviation base spirit of octane number 72 (C.F.R. motor method), which was increased to 90 by the addition of 1.15ml. tetraethyl lead per litre. Brown coal tar gave motor spirit of octane number 62–64 and aviation base spirit of 68. Ratings for spirits from brown coal were about two units higher; diesel oil from the same process had a cetane number of 40–42.

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Hydrogen Bomb. *See* Atomic Weapons in N.V.

Hydrogen Peroxide (H_2O_2). Colourless or faintly bluish liquid, an unstable compound of hydrogen

and oxygen. It was discovered in 1818 by Thénard, who prepared it by the action of dilute hydrochloric acid on barium peroxide. It can be prepared on the commercial scale by several methods, *e.g.* by dissolving barium peroxide in water and adding sulphuric acid. Commercial solutions of hydrogen peroxide are sold in several strengths from 10, 12, and up to 100 volumes, *i.e.* aqueous solutions containing sufficient to yield 10, 12, or 100 times their own volume of oxygen when decomposed.

The chief use of hydrogen peroxide is as a bleaching agent. In medicine it is used as an antiseptic wash for wounds.

Hydrography. Branch of physical science which deals with the surface waters of the earth. Hydrographical research consists chiefly in the obtaining and preparation of material for navigation, etc., and is an important part of the work of the navies of all nations in peace time. The first important hydrographical survey was that carried out over a number of years by Captain James Cook (*q.v.*), who surveyed the St. Lawrence River from Quebec to the sea, the coasts of Newfoundland and Labrador, and the N. and S. Pacific Oceans. In 1795 was founded the British Hydrographic Office, an office which now has a counterpart in the administration of most civilized nations. At its head is the hydrographer of the navy, who is the official adviser on all hydrographical survey.

The preparation of navigation charts and their constant revision, the surveying of harbours and compilation of data, and issuing of directions to navigators; the reporting of derelicts, areas of fog and icebergs, etc., shifting shoals, varying currents, etc., all come within the scope of hydrography.

A hydrographic survey is necessary whenever there is any extensive interference with a natural drainage system, *e.g.* such work as the irrigation dams of the Nile, Euphrates, etc. See Chart; Ocean; Meteorology; Navigation.

Hydrokinetics (Gr. *hydōr*, water; *kinein*, to move). Science of fluids in motion. The fluids considered are understood to be "perfect fluids," in which there is no friction or viscosity between one part of the fluid and another, and the results obtained are often subject to considerable modification in their application to actual fluids, such as water, in which viscosity exists. Certain general principles are universally applicable.

Consider a river flowing with uniform speed between parallel banks, and imagine that the stream first narrows and then recovers its original breadth, the depth being constant throughout. The velocity of the stream increases at the narrow part, since the same quantity of water has to pass this point in a given time as passes any other point on the bank. The way in which the speed of a stream varies inversely with its cross-section is known as the "law of continuity." Another fundamental law, due to Bernoulli, states that in steady flow the sum of the potential energy, the pressure energy, and the kinetic energy of a fluid remains constant: therefore the pressure diminishes as the velocity increases, and increases as the velocity diminishes.

When water is allowed to escape through a small hole in the side or bottom of a vessel open at the top, the theoretical velocity of the jet depends on the height of the water-level above the hole, and is exactly as great as would have been acquired by the water in falling freely a distance equal to this height. In practice, however, owing to friction, the velocity of the escaping jet is somewhat less.

Wave Motion

One of the most interesting and important forms of fluid motion is wave motion. This may be defined as a periodic or rhythmic motion transmitted through a fluid. The most familiar example, that of the waves on the sea, exhibits the appearance of waves making their way over the surface of the water, but the actual motion of the water is oscillatory. The waves set up by a moving ship are important, as much of the energy of the ship's engines is absorbed in producing them. A different type of fluid wave is the sound wave, which occasions at every point of its passage through air or water an alternate compression and rarefaction of the fluid. Attention has recently been called to the possibility of transmitting a periodic impulse by means of water waves of the same general type as sound waves; this method has already found more than one practical application. See Hydraulics.

Hydrolysis. The breaking down of a substance into simpler or different substances by the addition of water. Thus, ferric chloride, FeCl_3 , when dissolved in water so as to make a dilute solution, produces the hydrate, $\text{Fe}(\text{OH})_3$, and hydrochloric acid, HCl . Cane sugar, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$,

when dissolved in water containing a small amount of acid, breaks up into a mixture of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, and levulose, $\text{C}_6\text{H}_{12}\text{O}_6$; cane sugar is similarly hydrolysed by water containing yeast. It should be borne in mind that liquid water is not merely a collection of molecules of H_2O but that it contains hydrogen ions, H , and hydroxyl ions, OH , constantly uniting and breaking up again. Hydrolysis is responsible for the assimilation of food by the bodies of animals, the active agents in this process being catalysts known as *enzymes*.

Hydromel (Gr. *hydōr*, water; *meli*, honey). Beverage made of honey and water. It is usually fermented (then known as mead), and flavoured with spices or hops. It was known to the Greeks and Romans, and when mixed with wine it was called *mulsum*. In medieval times in Great Britain a similar drink was called "clarre" or "piment." See Honey; Mead.

Hydrometallurgy. Term used to describe that branch of metallurgy in which large quantities of water are used for the extraction of metals from their ores. Apart from gold (*q.v.*), copper is the chief metal to be extracted in this way, though only under certain conditions. In general, if the ore is rich, it is far more economical either to concentrate the metallic minerals and smelt, or to smelt the ore direct. But for low-grade ores, if the copper is in a form soluble in water, dilute acids, or ammonia, or can be readily converted to such a form, *e.g.* by roasting, it is economical to dissolve the copper from the ore, and recover it from the solution. Originally these processes were carried out by nature, the ore body became oxidised in the summer, and when the rain came it leached the copper out of the ore. Much of the copper recovered from the Rio Tinto mines was accumulated in this way. Such leaching has been carried out artificially, but usually the ore is crushed, piled into heaps or into large tanks or vats, and mixed with water. The solution is then circulated or agitated until the copper is dissolved. Copper is recovered from the solution either by adding scrap iron, which precipitates the copper in an impure form, or electrolytically, which, although more expensive, gives a purer product. At many mines the tailings dumps from the concentration processes for smelting are now treated by wet methods to recover copper previously

wasted. See Copper; Electro-metallurgy; Metallurgy.

Hydrometer (Gr. *hydōr*, water; *metron*, measure). Instrument for comparing the densities of liquids.

The volume of a body immersed floating in a liquid depends on the density of the liquid, the weight of the liquid displaced being equal to the weight of the body, and this weight of liquid equals the volume of the body immersed multiplied by the density of the liquid. Hence the volume of a body immersed in different liquids can be used to compare the densities of the liquids.

A type of instrument commonly used consists of a glass bulb above which is a graduated glass rod, and below a smaller bulb which can be loaded by varying the density of circular weights;



Hydrometer. Instrument for measuring the density of liquids

the number on the weight is added to the scale reading. A similar hydrometer, made entirely of metal and known as Sykes's hydrometer, is used by the excise authorities in determining the specific gravity of beers and spirits. Another similar instrument called a lactometer is used to find the s.g. of milk. Because of the sensitivity of measurement required, the same instrument cannot be satisfactorily used for different liquids or solutions.

An alternative to the Sykes's hydrometer, the Twaddell hydrometer, composed of six instruments each with a short stem (narrow for maximum sensitivity) and loaded with different weights of mercury in the lower glass bulb, cannot be used for liquids of lower density than water.

Nicholson's hydrometer, the hydrometer of constant immersion, is a laboratory instrument. It has a pan on its upper end upon which weights can be placed. From the different weights placed in this pan to cause the hydrometer to sink to a fixed level in different liquids the density of those liquids can be calculated. With this form of hydrometer, which also has a pan at its lower end, the specific gravity of some solids can be found.

Hydromica. General name for a group of minerals characterised

by a micaceous habit and resembling normal micas in composition; their foliae are, however, less elastic. This rather vague group name is usually applied to secondary micas which cannot be positively identified (e.g. sericite). They are often derived by alteration of primary minerals in rocks. Although often hydrous, it does not appear that hydromica need necessarily contain more water than ordinary mica, but it may give it off more readily on heating. See Mica; Muscovite, etc.

Hydronephrosis. Condition in which the normal cavities of the kidney fill and dilate through the presence of sterile urine caused by back pressure in some of the lower lying adjacent structures of the urinary tract, which pressure is due to stricture or tumour. The condition may be congenital. If the condition is slight, there may be no symptoms; if it is severe there is pain, frequency of micturition, and possibly blood in the urine. Diagnosis depends mainly on an X-ray of the parts after they have been rendered opaque by an injection of lipiodol into the veins. Treatment varies from the wearing of a supporting belt to the removal of the kidney.

Hydrophathy (Gr. *hydōr*, water; *pathos*, suffering). Treatment of disease by water. Establishments exist to give this treatment, which has an important medicinal function. The drinking of medicinal waters, wet packs hot or cold, specialised baths, and so forth, relieve certain forms of disease, such as rheumatism and gout.

Among the ancients, treatment by water was advocated by Hippocrates and Asclepiades. According to Suetonius, the emperor Augustus and the poet Horace were restored to health by cold baths prescribed by Antonius Musa. In the 7th and 8th centuries cold effusions were resorted to in the treatment of affections of the head, and in the 12th century treatment by water was advocated for the cure of dysentery.

The action of water applied to the skin is in the first instance thermic and mechanical, the effect being to stimulate the peripheral nerve endings. The effect of cold baths is to contract the small blood vessels in the skin, thus bringing about a rise in the general blood pressure and stimulating the circulation. Heat, however, is abstracted from the body. For this reason cold baths are beneficial to the young and healthy, but should be resorted to with discretion by

those past middle age or those in whom the circulation is not active. Cold baths, cold packs, or ice packs are used to reduce the temperature in fever. An ice cap applied to the head in meningitis and affections of the brain is of value. Warm baths have a soothing effect upon the nervous system, and sometimes relieve pain. A very hot quick bath relieves fatigue, but immersion must be short. Hot fomentations relieve localised pain and inflammation. Cold packs may, however, be preferred. Heat attracts the blood into dilated blood vessels when the white cells attack the cause of inflammation; cold shrinks the vessels and drives away the blood.

It was formerly held that the drinking of large quantities of water washed out and purified the body. This was not borne out by experience; on the contrary, digestion was apt to be impaired and the kidneys were overworked. In some forms of dyspepsia a glass of hot water is of service, and in acute infectious diseases cold water may be taken every two hours. To get special results in special conditions, many different baths and douches are used. See Baths; Spa.

Hydrophobia (Gr. *hydōr*, water; *phobos*, fear) or RABIES. Acute disease due to a filterable virus located in the salivary glands and central nervous system, transmitted by inoculation, usually by a bite. Dogs are most frequently affected. As a result of the muzzling of dogs order, 1897, the disease was eliminated in Britain. Re-introduced towards the end of 1918, it was stamped out again.

It is by no means certain that a person bitten by a rabid dog will develop the disease. The period between infection and the appearance of the symptoms is variable, in most cases ranging from six to eight weeks. The nearer to the head the bite is, the shorter is the incubation. In dogs the course of the disease is quicker than in man; the animal becomes vicious, there is quick onset of paralysis, followed by death within a week.

The early symptoms in man are pain and irritation in the neighbourhood of the bite, headache, loss of appetite, depression, irritability, sleeplessness, and some difficulty in swallowing. As the disease progresses the excitability increases, and any slight shock or sudden noise will cause a violent spasm, particularly affecting the muscles of the throat and mouth. A spasm may be produced by any

attempt to drink, hence the name hydrophobia, or "fear of water," given to the disease. In man, once symptoms appear, the disease ends fatally, death occurring from exhaustion and paralysis.

Pasteur found that when the poisonous material was injected into a rabbit, and another rabbit was inoculated from the first, and so on through a series, the virulence increased, and the incubation period could be gradually reduced to seven days. The toxic material is present in the spinal cords of these rabbits, but gradually diminishes when they are preserved in dry air. If now a dog is inoculated from the material in a cord with only a weak degree of the virus, and then successively from cords containing the virus in stronger forms, the dog gradually acquires immunity to the disease. Similar treatment of human beings during the incubation period by inoculation with virus or emulsions made from the dried spinal cords of inoculated rabbits brought the mortality rate down to one p.c. No specific treatment for the spasms, once present, is known. Curare, chloroform, and morphia help to alleviate distress.

Hydrophone. An instrument, perfected during the First Great War, which detected the presence of submarines by their sounds. It was lowered into the water, and consisted essentially of a heavy metal ring carrying a thin steel diaphragm with a small water-tight capsule attached at its centre. The capsule contained a granular carbon microphone, connected by wires to a receiver in the ship. A trained listener could distinguish between the sounds emitted by different types of underwater craft. Before the Second Great War hydrophones had been superseded in the Royal Navy by a supersonic device for submarine detection called Asdic (*q.v.*).

Hydrophyte. Term applied to plants which habitually live in water, often used especially of water-inhabiting flowering plants to emphasise their water habitat. Some hydrophytes grow rooted in the mud at the bottom and extend their relatively flexuous stems or their leaf stalks upwards so that the simple blades of most of their leaves float on the surface (*e.g.* water buttercup; water lily). Leaves that remain immersed are frequently very thin or much divided so as to provide an extensive surface for carbon-dioxide absorption from the water. Two

contrasting forms of leaf may occur in one plant, *e.g.* the water buttercup has simple floating leaves and submerged leaves divided into numerous, almost thread-like strands. Some plants (*e.g.* arrowhead) have a third form of leaf which projects into the air; other rooted water plants form relatively stout stems (*e.g.* mare's tail) the upper parts of which project into the air.

A number of hydrophytes float freely on the water surface (*e.g.* duckweed; frog-bit), their roots dangling more, perhaps, to keep the plant right way up than for absorption, as this occurs through all the immersed surfaces of water plants. A third category of hydrophytes is rootless (*e.g.* bladderwort; hornwort) and usually lies below the water surface.

Hydrophytes commonly have poorly developed xylem and their immersed parts are devoid of stomata. Intercellular spaces are strongly developed and are used to store oxygen produced during photosynthesis. Most raise their flowers into the air for wind or insect pollination, though a few (*e.g.* hornwort) produce their flowers under the water, by the movements of which pollination is effected.

Hydroplane. A flat-bottomed craft, usually motor-driven, and capable of skimming over water at a high speed. The term was at one time misapplied to aircraft which take off from water (seaplanes). Used as a verb, however, the word can be correctly applied to the progress of a seaplane skimming water with hull or floats partially immersed.

Hydroponics. Science of growing crops in liquid culture media without soil. Hydroponics developed from the old horticultural curiosity of growing watercress on a layer of damp flannel. In order to achieve healthy growth, a plant requires air, water, and light, and certain chemical elements. The correct chemical fertilisers mixed with even poor soil ensure rapid and sturdy growth, but it was long believed that fertilisers were a secondary contribution to plant growth, and that soil was the first essential. In 1927 experiments began at East Malling agricultural research station which demonstrated that crops could be raised without soil if plants were supplied with balanced chemical compounds in solution.

The method used in hydroponics varies with the species of the plant and the size of crop desired.

Maize, corn, or grass can be grown for cattle fodder in a special cabinet, made of galvanised iron, measuring 8 ft. square by 6 ft. high. The interior is fitted with racks to hold 64 galvanised-iron trays in four tiers, while below the tiers is space for a further 16 trays in tiers of four resting on the bottom of the cabinet.

Each tray is stamped with alternate rows of perforations and wells; the latter, resembling small thimbles, hold sufficient of the nutrient solution to feed the germinating seeds and their sprouts for 24 hrs. Above each tier of trays is a finely-perforated spreader, capable of saturating the trays evenly, and connected to a 50-gall. tank of nutrient solution on top of the cabinet.

Six lb. of seed is sown in each of the two lower trays of the four tiers resting on the bottom of the cabinet (eight trays in all), the seeds being so spread that only a few lie in each well. Evenly distributed by the spreaders, the solution pours down from the top of the cabinet and percolates through the perforations in the trays until it reaches the bottom trays of seed. When these have been covered it is turned off. At the end of 24 hrs. the saturated seeds are sprouting and are transferred in their trays to the top rack, eight more trays of newly-sown seed being placed in the bottom of the cabinet.

This procedure is repeated until all the trays are filled with seeds and shoots in various stages of growth. On the 11th day the first sowing has reached a growth of 10 ins., and the roots have formed a mat about an in. thick. The crop is at its most nourishing as cattle fodder, and can be removed from the trays and given to the animals as it stands; 10 lb. of fodder so grown are equivalent to 30 lb. raised from the soil. The phosphur content is 600 p.c. higher, the lime content 300 p.c. Working to capacity, an 80-tray cabinet produces 2 cwt. of fodder daily in a 10-day cycle, eight trays of fodder coming out each day and eight trays of freshly-sown seeds going in.

Fruit and vegetables can be cultivated hydroponically by an identical process. The cost is higher than that of normal soil culture; but the system was used in Japan to grow food for the Allied occupation troops.

Hydroquinone, HYDROKINONE, OR QUINOL (para-dihydroxybenzene, $C_6H_4(OH)_2$). Fine white

needle crystals much used as a photographic developing agent, especially in conjunction with metol (*q.v.*). First prepared by the French chemists Caventou and Pelletier, it is readily formed by the combination of hydrogen and quinone, an oxidation product of quinic acid. Its photographic uses were discovered by Abney in 1880. See Developer.

Hydrosphere. Term for the (incomplete) envelope of water on the earth's crust. It includes the great oceans with their numerous arms and the great inland seas.

Hydrostatic Balance. Laboratory instrument used for the determination of the s.g. of solids and liquids. Its working is based on the principle of Archimedes. It is a balance with one pan smaller than the other and suspended at a shorter distance from the beam. In this way bodies immersed in liquid are more easily accommodated below it.

Hydrostatics. (Gr. *hydōr*, water; *statikos*, causing to stand). Branch of physical science which deals with the equilibrium of fluids under the application of forces. A fluid at rest exerts pressure at right angles to any surface in contact with it, and this pressure is of equal intensity in all directions. According to Pascal's law of "transmissibility of fluid pressure," any increase of pressure at one point of a fluid in equilibrium is at once transmitted without diminution to every other point of the fluid. Thus water under pressure may be used to transmit a force from one point to another—the principle which lies at the basis of all hydraulic pressure machinery.

In the case of a fluid at rest under gravity, the pressure steadily increases with the depth below the surface, owing to the weight of supported fluid. All objects on the earth's surface are exposed to an atmospheric pressure, at sea level, of nearly 15 lb. to the sq. in., i.e. the weight of air which each sq. in. of the earth's surface has to sustain. At the top of Mount Everest the pressure per sq. in. is less than 5 lb., and the difference between this and the normal pressure is equivalent to the weight of a column of air equal to Mt. Everest in height and 1 sq. in. in section. In a similar way water pressure increases with the depth below the surface of the sea: at the surface it is equal to the atmospheric pressure; at the depth of 33 ft. this pressure is doubled, and it increases by one

"atmosphere" for each further 33 ft. of depth. There is, however, an important difference between liquids and gases in that liquids are almost incompressible, while gases are easily compressed. The density of a gas varies directly with the pressure, so that air at sea level is three times as dense as at the summit of Mt. Everest, but water is so little compressible that the increase of density at the bottom of the deepest sea (6 miles) is less than 4 p.c., even under the pressure of 14,000 lb. to the sq. in.

The total pressure of a fluid on a body immersed in it is given by the principle of Archimedes, which states that the resultant upward thrust of the fluid on the body is equal to the weight of the fluid which it displaces. When, for example, a submarine is completely submerged, it is pressed downwards by the water in contact with the upper half of its hull, and upwards by the water in contact with the lower half, but the pressure being greater at the greater depth there is a resultant upward thrust, which is just that which would suffice to balance the water displaced by the submarine. This law follows at once from the consideration that the displaced water was actually held in this position by the pressure of the surrounding fluid before the arrival of the submarine. In order that a submarine may remain submerged at the same level, therefore, its average density must be the same as that of the water. A surface ship sinks in the water until it displaces exactly its own weight of fluid; the upward thrust of the water is then just enough to balance the weight of the ship. The same principle applies to the equilibrium of an airship; the weight of air displaced is exactly equal to the total weight of the airship.

It follows from the principle of Archimedes that if a ship is to float its average density must be less than that of water; a steel ship floats because its average density is reduced to this point by the enclosed air. The shipbuilder has to secure not only the buoyancy of his ship, but also its stability; after rolling or pitching through not too large an angle it must be able to return to its upright position. See *Hydraulics*; *Hydrokinetics*.

Hydrotherapy. System of treating certain diseases by baths and mineral waters. It is thus a variant of hydrotherapy (*q.v.*).

Hydrothermal Deposits (Gr. *hydōr*, water; *thermos*, warm). Geologic deposits formed by permeation by hot waters of rocks or

of fissures and joints in rocks. During the emplacement of an igneous rock, such as granite or granodiorite, the activity of hot water solutions in the cooler invaded rock may give rise to contact metamorphic or pyrometamorphic deposits. During the later stages of consolidation of the igneous rock, important water-rich derivatives—often containing concentrations of the ore-metals—emanate from the centre of igneous activity. These solutions may effect profound changes by soaking into the solid rock, or they may ascend through fissures in which they may form barren veins or economic deposits of the ore-metals. According to the conditions at the time of deposition, such deposits are subdivided into hypothermal (high temperature, high pressure), mesothermal (moderate temperature, moderate pressure), and epithermal (low temperature, low pressure) deposits; less used subdivisions include the groups leptothermal, telothermal, and xenothermal (high temperature, low pressure) deposits. See *Geology*.

Hydroxylamine (NH_2OH). A colourless, crystalline substance which explodes violently when heated. Discovered by Lossen in 1865, it was obtained by the action of nascent hydrogen upon ethyl nitrate, the hydrogen being obtained from tin and hydrochloric acid. The hydrochloride is used as a photographic developer and in organic apothecoses.

Hydrozoa (Gr. *hydōr*, water; *zōon*, animal). Class of the zoological phylum Coelenterata (*q.v.*). They are commonly known as polyps, are in most cases marine, and usually of small size. While some swim freely, the majority are attached in adult life to rocks, shells, and plants. In their simplest form, the body consists of a bag with a single opening, usually surrounded with tentacles that assist in the capture of the minute organisms on which the animal feeds. Of the orders into which they are divided, the hydromedusae in their adult stage are generally fixed to foreign substances. The hydrocorallines produce a hard calcareous skeleton reminiscent of the true corals (*q.v.*). The Siphonophora swim freely, the Portuguese man-of-war being the best known example.

Hydrus. Southern constellation named by Bayer in 1603. It is near the lesser Magellanic cloud in the S. hemisphere.

Hyena. This mammal is more correctly spelt *hyaena* (*q.v.*).

Hyères. Town of France, in the dept. of Var. One of the most pleasant of the smaller resorts of S. France, it lies about 14 m. by rly. E. of Toulon, and 2½ m. from the sea. The mild, equable climate brings many visitors. R. L. Stevenson resided here in 1883; and fine villas and hotels, a casino, and several large nurseries developed. The town was damaged in heavy fighting before its liberation by French troops, Aug. 22, 1944, during the Second Great War. Salt is produced in large quantities at the Salins d'Hyères, 5 m. E. The Îles d'Hyères, Porquerolles, Port Cros and Levant Islands, the Roman Stoechades, lie off the bay and peninsula of Giens. Pop. (1954) 29,061.

Hygieia. In Greek mythology, the goddess of health. The reputed daughter of Asklepios (Aesculapius), she was worshipped in different parts of Greece. She is not to be confused with Athena Hygieia. The worship of Hygieia was introduced into Rome in 293 B.C., where she was at first called Valetudo, and later Salus, the name of a native Italian deity. In art Hygieia was represented wearing a long robe, sometimes feeding the serpent twined on the staff which was the attribute of Aesculapius (*q.v.*).

Hygiene (Gr. *hygieinos*, healthy). Science of the preservation of health and the prevention of disease. Personal hygiene relates to conduct of those aspects of life which the individual has under his immediate control—such matters as wise choice of food, wise use of exercise, adequate sleep, and maintenance of the bodily functions in normal activity. The larger matters pertaining to the maintenance of health and prevention of disease which demand co-operative effort on the part of the community, such as the provision of sufficient and wholesome water, efficient drainage, adequate housing, inspection of food, prevention and arrest of epidemics, etc., are part of public health, a sub-division of medicine of increasing importance.

Hygiene, LONDON SCHOOL OF. In full the London School of Hygiene and Tropical Medicine (University of London), this dates from 1921 when the Rockefeller foundation gave £454,500 to help its establishment. The building in Gower St. was formally opened by the prince of Wales in 1929. Bacteriology, biochemistry, and chemistry as applied to hygiene, entomology, medical statistics, para-

sitology, public health, applied physiology, and tropical medicine and hygiene are taught.

Hygrometer (Gr. *hygros*, damp; *metron*, measure). Instrument for measuring the amount of water vapour in the atmosphere. The commonest type of hygrometer consists of two thermometers placed side by side, the bulb of one being left dry, whilst that of the other is covered with fine muslin, kept constantly wet by a wick dipping into water. The water evaporates, and as some of the heat necessary to evaporate it is obtained from the thermometer, the temperature of the latter is lowered. Thus the wet bulb thermometer usually registers a lower temperature than the dry bulb thermometer. The difference between the two readings gives the means of obtaining the humidity of the air. The greater the difference between them, the smaller is the relative humidity. When the readings are the same the air is saturated, i.e. is holding its maximum amount of vapour.

For routine measurements at British and Empire meteorological stations the thermometers are usually mounted in a box with louvered sides, known as a Stevenson screen. Relative humidity, dewpoint temperature, vapour pressure, etc., can be calculated from suitable tables. To a certain extent, however, the evaporation from the muslin of a wet-bulb thermometer depends upon the rate of flow of air over the bulb. Hence, in order to obtain accurate measurements of humidity, it is necessary to maintain a definite rate of ventilation. This is achieved in the Assmann psychrometer with a clockwork or electrically driven fan which draws air over the thermometer bulbs, and in the "sling" psychrometer by whirling the thermometers in a frame.

A continuous record of relative humidity can be obtained by making use of the fact that human hair, uncontaminated and freed from natural oil, increases in length when placed in a damp atmosphere—the increase from dry to saturated air is approximately three p.c. In Richard's hair hygrometer a system of levers communicates the movements of a bundle of hairs to a pen which thus traces the variations in relative humidity upon a chart wound on a drum made to revolve by clockwork. Portable instruments, in which the movements of a single hair are communicated to a pointer, are widely used commercially,

e.g. to control air-conditioning apparatus in industrial processes.

In the electrical hygrometer due to Dunmore, two palladium wires are wound side by side on an insulating surface covering a metal tube. The intervening surface between the wires is coated with a thin film of lithium chloride solution mixed with a plastic binder. The resistance of this film changes with the degree of humidity owing to the hygroscopic nature of the lithium chloride. Since it depends upon electrical resistance, this device permits of automatic recording and it has been used, partly on account of its rapidity in action, to record humidities in the upper atmosphere. The apparatus is sent up in a radio-sonde balloon, and a small radio transmitter signals to the ground the indications of the recording instruments. A similar type of electrical hygrometer depends upon the alteration of the resistance of cotton threads when impregnated with certain hygroscopic salts.

In the chemical hygrometer, a known volume of air is aspirated slowly over tubes containing calcium chloride and the gain in weight of the tubes gives the actual mass of water vapour present in the known volume. This instrument is chiefly used for standardising other types. Another method of determining humidity lies in ascertaining the temperature at which dew will form on a polished surface whose temperature can be measured. During the Second Great War a very sensitive instrument of this type was designed by Dobson and Brewer (frost-point hygrometer) to provide information concerning the humidity of the lower stratosphere.

Hyksos. An Asiatic people of mixed origin, predominantly Semite, who dominated Egypt from c. 1720–1580 B.C. and are counted by Manetho as the XVth and XVIth dynasties; he called them "shepherd kings." The Egyptians referred to them simply as Asiatics, and later spoke of them with loathing. They established their capital at Avaris in the eastern delta and may at one time have held the whole country, but were later confined to the northern kingdom. Though they introduced foreign gods, they seem to have assimilated Egyptian culture, upon which they left little trace; no major monument has survived. The last Hyksos ruler, Apophis, was expelled by Kamose and his brother Aahmes I, founder of the XVIIIth dynasty.

Hyllus. In Greek mythology the eldest son of Hercules and Deianeira. He and his brothers fell in an unsuccessful expedition from Athens to regain a footing in the Peloponnese, from which they had been expelled. Hyllus fell in single combat with Échemus, king of Arcadia.

Hylozoism (Gk. *hylē*, matter; *zōē*, life). Theory which attributes a primitive and inherent life to matter, and regards life as being nothing more than one of its properties. The name Hylozoists is sometimes given to the earliest Greek philosophers.

Hylton, JACK (b. 1892). British impresario. Born at Bolton, July 2, 1892, he became an accompanist to a concert party, a conductor of revues on tour, and a cinema organist before becoming a dance-band leader at the Piccadilly hotel and the Kit-Cat club. In 1924 he organized a dance band, pre-eminent in its class for the next 15 years. In 1940 Hylton took up management, and organized a music hall tour by the London Philharmonic Orchestra in that year. He later put on many straight and musical plays in London. The French government made him a member of the Legion of Honour and Officier de l'Instruction Publique.

Hymans, PAUL (1865-1941). A Belgian statesman. Born at Ixelles, Brussels, March 23, 1865, and educated at Brussels university, he was called to the bar in 1885. In 1895 he became professor of comparative parliamentary history at Brussels university. Entering parliament in 1900 as Liberal member for Brussels, he soon became leader of his party. When on Aug. 2, 1914, Germany demanded passage through Belgium for the German army, Hymans joined the government as minister without portfolio, and went to the U.S.A. to enlist the sympathy and support of President Wilson. In 1915 he was appointed Belgian minister in London, where he had to deal with the large influx of refugees. In 1917 he joined the Belgian government at Havre as minister of economic affairs, and at the end of the First Great War became foreign minister. He represented Belgium at the peace conference and was one of the signatories of the Versailles treaty. He also signed the League of Nations covenant, which he had helped to draft. In 1920 he was appointed Belgian representative to the League of Nations and presided over the first assembly at

Geneva. He was Belgian foreign minister 1924-25, 1927-1934, and again in 1935. He retired 1936, and died at Nice, March 8, 1941.

Hymen or **HYMENAEUS**. In Greek mythology, the god of marriage, son of Bacchus and Aphrodite or of Apollo and one of the Muses. He was always invoked at marriages, in a bridal song called Hymen. On the other hand the personality of Hymen may have been invented to explain the song. Hymen is represented as a youth, bearing a bridal torch. See Marriage.

Hymen. Membrane which partially closes the external opening of the vagina, the female genital passage. It is named after the Greek god of marriage. Its presence does not prove virginity, nor its absence loss of virginity.

Hymenomycetales. Extensive family of fungi. They are characterized by the spore-producing surface consisting of a hymenium or membrane spread over plates or gills (Agaricaceae), lining tubes or depressions (Polyporaceae), covering spines (Hydnaceae), or investing the greater portion of club-shaped or branching fungi (Clavariaceae). As in all the class Basidiomycetes, the spores are naked and borne in fours on the club-shaped terminal cell (basidium) of a thread (hypha), each spore being produced on a stalk (sterigma).

HYMN: AND WRITERS OF HYMNS

G. A. Leask, Author of *The Story of Our Hymns*

This article, which concludes with an account of hymn tunes, traces the development of the modern hymn from the early days of the Church. See Psalm; also the biographies of the leading hymn writers: Watts, Isaac; Wesley, Charles, etc.

A hymn (Gr. *hymnos*, a poem) is a song of adoration and thanksgiving to God, or a petition and confession. Hymns are usually associated with public worship, but many are suited for private devotion. The origin of the hymn can be traced to the ancient Hebrew psalm, and in scripture hymn and psalm are interchangeable.

EARLY HYMNS. Hymnody developed first in the Eastern Christian Church. The oldest Christian hymn whose authorship is known is Shepherd of Tender Youth, from the Greek, and is attributed to Clement of Alexandria (150-220), whose hymn for children in which Christ is referred to as Sure Helm of Babes, is well known.

Most modern hymnals contain translations of hymns from the Latin and Greek composed c. 100-700. The famous *Ter Sanctus*,

Hymenoptera (Gk. *hymen*, membrane; *pteron*, wing). A very large order of insects including the saw-flies, ichneumon flies, ants, bees, and wasps. More than 80,000 species are known and comprise minute to large insects having membranous wings with relatively few veins. The hind wings are the smaller and are linked with the fore pair by hooklets. A number of species, including worker ants, are wingless. The mouth-parts are for biting and licking, a median tongue, or glossa, being present. The abdomen has its first segment merged into the thorax and a sawing or piercing ovipositor is present which, in bees, wasps, and some ants, is modified into a sting. The larvae are either caterpillars associated with plants, as in saw-flies (*q.v.*) or are legless grubs. In the ichneumon flies (*q.v.*) and their allies the larvae live as parasites of other insects, etc.; while in the ants and certain bees and wasps, which are social in habit, they are fed and tended by sterile individuals (workers). Over 6,000 species of Hymenoptera are found in Britain, contained in more than 1,000 genera. See Ant; Bee; Wasp, etc.

Hymettus. Mountain of Attica, ancient Greece, about 4 m. S. of Athens, now called Trelo Vouno. It is 3,360 ft. in height, and is celebrated for marble quarries and honey.

based on Isaiah 6, 3, familiar as Holy, holy, holy, Lord God Almighty, and the Gloria in Excelsis, based on the song of the angels at Bethlehem, belong to an early date, though they have been placed as late as the 5th century. Bishop Synesius (375-430), who wrote Lord Jesu, think of me, and Niceta, bishop of Dacia, are well-known names. Another early hymn is the famous O Gladsome Light, sung at the lighting of the lamps, and familiar in Keble's translation, Hail! Gladdening Light. The Te Deum, regarded as the greatest of all songs of praise, is placed towards the end of the 4th century, and usually ascribed to S. Ambrose (340-397), bishop of Milan, though some authorities date it later. S. Ambrose put Latin hymnody on the footing it held in the Western Church for many centuries. S.

Hilary, bishop of Poitiers (d. 368), another great name in early hymnody, is overshadowed by S. Benedict of Nursia (d. 541), whose hymns became an established part of early English Church hymnody up to the middle of the 16th century. Venantius Fortunatus, bishop of Poitiers (d. 609), wrote about a dozen hymns, including *The Royal Banners forward go*. Later, the famous *Come, Holy Ghost, our souls inspire*, attributed to Charles the Great (d. 814), and to his grandson Charles the Bald, enjoyed wide popularity. All glory, laud, and honour, by Theodulphus (d. 821), is second only to the *Te Deum*.

MEDIEVAL HYMNS. These are largely concerned with mysticism and inward searching of the heart. Among their writers Notker Balbulus (840-912), of the Benedictine monastery of S. Gall, is a leading name, but the greatest medieval hymn writer is S. Bernard of Cluny (not to be confused with his namesake of Clairvaux), who wrote *Hora Novissima*, a poem on the subject of the last part of the Book of the Revelation.

S. Bernard of Clairvaux

S. Bernard of Clairvaux composed hymns which are the heritage of the whole Church (Jesu, the very thought of Thee; Jesu, Thou joy of loving hearts). Brief life is here our portion; For thee, O dear, dear country; and Jerusalem the Golden are Dr. J. M. Neale's versions of hymns by Bernard of Cluny (12th century). A famous composition of the 13th century is *Dies irae, dies illa* (That day of wrath, that dreadful day), a Latin hymn of the Day of Judgement generally attributed to Thomas of Celano.

MODERN HYMNODY. Martin Luther gave the German people the first Protestant hymn-book. Though a translator of Latin hymns, he wrote original sacred verse, including *A Mighty Fortress is our God*, the "Marseillaise" of the Reformation." Next to Luther in importance is Paul Gerhardt, whose most familiar hymn is *Give to the winds thy fears*. Hymnology owes much to the German school, and the leading names, in addition to the above, are: Nikolaus Selnecker, Herman and Hans Sachs, Ringwaldt, Rinckhart, Dessler, Hiller, Arnold, and Zinzendorf. Rinckhart's famous hymn is familiar to us through the version of Catherine Winkworth (1827-78), beginning *Now thank we all our God*. Something every heart is loving is Mrs. Bevan's translation of Tersteegen's *Jedes Herz will*

etwas lieben. Count Zinzendorf wrote over 2,000 hymns.

ENGLISH HYMNODY. In England Latin hymns held the field until the Reformation. The evolution of the English hymn can be traced from the metrical psalms and paraphrases used in public worship. From 1516 to 1696 the authorised book of the Church of England was the *Old Version* of Sternhold and Hopkins, and from the latter date to the adoption of the modern hymnal the *New Version* of Tate and Brady. Coverdale had attempted translations of hymns from the German, and Cranmer and Hilsey from the Latin, but these were not a success.

Sacred Verse of the 17th Century

Some of the finest hymns find no place in English church hymnals, not being intended for congregational singing, e.g. Milton's *Ode on the Morning of Christ's Nativity*; Walter Scott's *When Israel of the Lord beloved Out of the Land of bondage came*. In the 17th century was produced sacred verse full of quaint conceits, artificial and metaphysical in form and phraseology. George Wither (1588-1667) was creator of the hymn-book entitled *The Hymns and Songs of the Church*. He aimed at providing a hymn for every occasion. Francis Quarles wrote a large number of religious verses, the best being his *Emblems*; Robert Herrick wrote many sacred pieces; William Barton was the author of *Six Centuries of Select Hymns and Spiritual Songs*. His hymns are chiefly paraphrases of the Bible narrative. George Herbert (1593-1633) was a noted hymn writer of this period.

Present-day hymnody arose in the 18th century, the great names of which are Charles Wesley, Isaac Watts, Doddridge, Cowper, Newton and Toplady. John Wesley compiled the first real hymn-book for use in the Church of England, made by him during his mission in Georgia, U.S.A. His brother, Charles, wrote over a thousand hymns. Even today all hymnals contain a number of his best pieces, chief of which is the beautiful *Jesu, Lover of my Soul*. Augustus Toplady (1740-78) is the author of the companion classic *Rock of Ages*. Cowper wrote the favourite *God moves in a mysterious way*; Hark, my soul, it is the Lord; There is a fountain filled with blood, and published with John Newton (1725-1807), the fervent *Olney Hymns* (1779). Isaac Watts is claimed by many as the "inventor" of the English hymn.

What may be said is that Watts made it representative of the aspirations of the majority of Christian people and Charles Wesley developed the hymn as the expression of the individual soul's particular needs.

During the 19th century hymns became more literary in expression, chiefly through the influence of Bishop Heber (1783-1826). Edward Bickersteth's *Christian Psalmody* was followed by the *Hymnal Companion* (1870-76) by his son, Bishop E. H. Bickersteth. An important landmark was the appearance of the famous *Hymns Ancient and Modern*, first issued in 1860-61, with supplements in 1889 and 1916. It was edited by Sir W. W. Baker (1821-77), who himself contributed many translations and hymns, e.g. *The King of Love my Shepherd is*. Ten years later appeared *Church Hymns*, published by the S.P.C.K., which had nearly as important an influence. In 1906 appeared the *English Hymnal*, containing hymns written by contemporary authors, e.g. Chesterton and Kipling, as well as the historic ones. This was followed in 1925 by *Songs of Praise*, edited by Dr. Percy Dearmer. The free churches mostly have their own collections of hymns, as do certain colleges, cathedrals, and parish churches. Mention should also be made of the popular "sacred songs" introduced by the American Evangelists Moody and Sankey. The Salvation Army uses the simplest possible hymns set to popular or topical tunes.

Famous Hymn Writers

The more important hymn writers of the 19th and 20th centuries may be briefly indicated as follows:

James Montgomery (1771-1854), *Hail to the Lord's anointed*; Harriet Auber (1773-1862), *Our blest Redeemer, ere He breath'd*; Sir Robert Grant (1785-1838), *O worship the King*; Charlotte Elliott (1789-1871), *Just as I am, without one plea*; Henry Hart Milman (1791-1868), *When our heads are bow'd with woe*; John Keble (1792-1866), *Sun of my soul, Thou Saviour dear, and New every morning is the love*; H. F. Lyte (1793-1847), *Abide with me*; John Henry Newman (1801-90), *Lead, kindly Light, and Praise to the Holiest in the height*; Sarah Adams (1805-48), *Nearer, my God, to Thee*; Horatius Bonar (1808-89), *When the weary seeking rest, A few more years shall roll, and I heard the voice of Jesus say*; Dean Alford (1810-71), *Forward be our watchword, and Ten thousand times ten thousand*; Jemima Luke (1813-1906), *I think when I read that sweet story of old*; F. W. Faber

(1814-63), Souls of men, why will ye scatter; Cecil Frances Alexander (1823-95), Once in royal David's city, There is a green hill far away, and many other children's hymns; E. H. Bickersteth (1825-1906), Peace, perfect peace; Albert Midlane (1825-1909), There's a Friend for little children; John Ellerton (1826-93), Saviour, again to Thy dear Name we raise, and The day Thou gavest, Lord, is ended; S. Baring-Gould (1834-1924), Onward, Christian soldiers, and Through the night of doubt and sorrow; F. R. Havergal (1836-79), Golden harps are sounding, Who is on the Lord's side, and Take my life and let it be; W. C. Dix (1837-98), Come unto Me, ye weary, and As with gladness men of old; George Matheson (1842-1906), O Love that wilt not let me go; Katherine Hankey, Tell me the old, old story; Bishop Heber (1783-1826), From Greenland's icy mountains; Canon Twells (1823-1900), At even ere the sun was set; Archbishop MacLagan (1826-1910), The saints of God! their conflict past; Fanny Crosby (Mrs. Alstyne) (1823-1915), Rescue the perishing, and Safe in the arms of Jesus; Hugh Stowell (1799-1865), Jesus is our shepherd; Elizabeth C. Clephane (1830-69), There were ninety and nine; Bishop Walsham How (1823-97), For All the Saints; Edward Hayes Plumptre (1821-91), Thy Hand, O God, has guided. Hymns by Sir Henry Newbolt, A. C. Benson, Robert Bridges, and others are included in various hymnals.

Bibliography. Many meritorious works on hymnology have appeared, the more important including Hymns, their history and development, Sir R. Palmer (Lord Selborne), 1892; Dictionary of Hymnology, J. Julian, rev. ed. 1907; Studies of Familiar Hymns, L. F. Benson, 1908; Early Christian Hymns, D. J. Donahoe, 1908-11.

HYMN-TUNE. This is a melody to which the recurring stanzas of a hymn are sung. Hymn singing, as distinguished from psalm singing, began in the 4th century. The use of metrical hymns in Latin inspired the composition of accompanying tunes, many of which are extant. They were, of course, unharmonised, but in 1589 Palestrina published his *Hymni Totius Anni*, with the tunes treated in polyphonic style for three, four, five, and six voices, which gave a great impetus to the practice of singing hymns. At the Reformation Luther, himself a skilled musician, perceived the attractive power of music over the people, and through the efforts of the reformers a large number of *Choräle* were written, which became a part of the very life of the Germans. In Switzerland, France, and England equal zeal was manifested. Metrical versions of the psalms became popular in this

country, and psalters (*g.v.*) were published with suitable tunes.

The revival movement of the Wesleys and Whitefield derived much of its force from the singing of hymns, which these evangelists supplied in vast numbers, utilising for the most part familiar tunes. In the 19th century hymn singing became more than ever a popular part of congregational worship, and many hymnals and tune books were brought out, by far the most popular being *Hymns Ancient and Modern*, 1860-61. As the authors of new hymns tended to use other than the common and long metres, new tunes were necessary, and were supplied by such composers as Gauntlett, Barnby, Dykes, Sullivan, Stainer, Smart, Steggall, S. S. Wesley, and Hopkins, and, later, Martin Shaw, Holst, and Vaughan Williams.

Hymn of Hate. German ballad produced in the First Great War. It was written in the autumn of 1914 by a minor German poet, Ernst Lissauer, who was a private in the Prussian army and of Jewish origin. It became the rage of the day, and its author was awarded the Iron Cross. Typical lines translated,

We have all but a single hate,
We love as one, we hate as one,
We have one foe, and one alone—
England!

It was paralleled to some extent in the Second Great War by a similar song, *We march (sail) against England*.

Hyndman, HENRY MAYERS (1842-1921) A British socialist. Born in London, March 7, 1842, and educated at Trinity College, Cambridge, he began life as a journalist, being correspondent for *The Pall Mall Gazette* in the Austro-Prussian War of 1866, and on the staff of *The Melbourne Argus* in 1869. Becoming a convert to the revolutionary socialism

of Marx, he founded the Social Democratic Federation in 1881.

Hyndman contested Burnley as a Socialist three times without success. His publications included *Indian Policy* and *English Justice*, 1874; *Historical Basis of Socialism*, 1883; *The Record of an Adventurous Life*, 1911; *The Evolution of Revolution*, 1920. He died Nov. 22, 1921. Consult Hyndman, *Prophet of Socialism*, F. J. Gould, 1928.

Hyne, CHARLES JOHN CUTCLIFFE WRIGHT (1865-1944). A British novelist. Born at Bibury, Glos., May 11, 1865, and educated at Bradford grammar school and Clare College, Cambridge, he travelled widely, mainly in the little ships whose officers he grew to know so



C. J. Cutcliffe Hyne,
British novelist
Elliott & Fry

well and portrayed so vividly in his books. The little red-headed Captain Kettle, a secondary character in *Honour of Thieves*, which was serialised in *Answers* in 1895, became the central figure of a series of adventure stories appearing over forty years, illustrated in *Pearson's Magazine* by Stanley L. Wood. In a different vein, he wrote *Recipe for Diamonds*, 1894; *The Lost Continent*, a tale of pre-history, 1900; and *Don't You Agree?*, putting forward his political views, 1936; *Wishing Smith*, 1938, and many others. He died March 10, 1944.

Hyogo. Part of the port of Kobe, Honshu, Japan. In the 12th century Hyogo was the Japanese capital for a short period; a harbour was later made and became one of the great marts, and in the

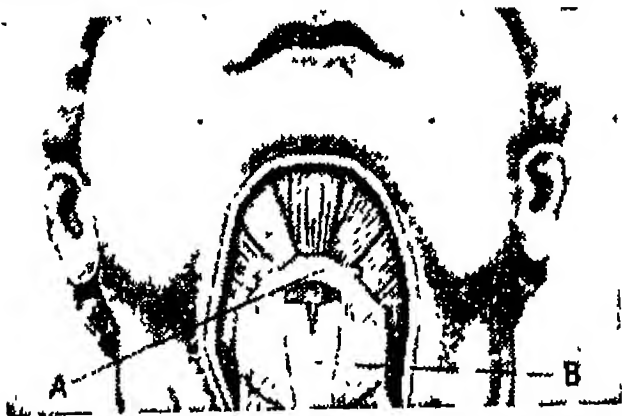
18th century nearly 800 vessels belonged to the port. In 1867 a few fishing villages occupied the area E. of Hyogo, and there the port of Kobe was established as a treaty port which absorbed Hyogo in 1886. See Kobe.

Hyoid Bone (*Gr. hyoëides*). In human beings, a U-shaped bone situated at the base of the tongue.



Hyogo, Japan. The bronze image of Buddha in the Shinkoji gardens

It may be felt immediately below the chin, and serves to give attachment to some of the muscles which



Hyoid Bone. Base of the tongue showing, A, hyoid bone and, B, larynx

move the lower jaw and tongue. See Hyostyly; Tongue.

Hyoscyamine. Alkaloid contained in henbane (*Hyoscyamus niger*), in belladonna (*Atropa belladonna*), and in stramonium (*Datura stramonium*). It is usually associated with atropine, and is readily converted into the latter by heat. A trace of hyoscyamine applied to the eye produces dilatation of the pupil. The alkaloid is a poison. For a similar alkaloid known as hyoscine, see Henbane.

Hyoscyamus Extract. An extract from the leaves of henbane (*Hyoscyamus niger*). It is employed in medicine as a nerve sedative and in the relief of spasm.

Hyostyly. Term in anatomy. The upper jaw in the vertebrate skull is formed of elements which are separate from those enclosing the brain, and which are probably derived from skeletal elements belonging to the sets which support the series of gill-bars. The upper jaw, derived in this way, may be attached to the brain-case in a number of different ways. If it is attached by the intervention of an upper element of the next more posterior set of gill-bar elements—called the hyoid set—the fish (shark or dogfish) in which this condition is found is said to exhibit hyostyly, or hyostylic suspension of the jaw. In higher forms this method of jaw-suspension is lost.

Hypanthium OR **HYPANTHIDIUM.** In botany, the fleshy, enlarged hollow end of the peduncle which supports certain flowers, such as that of the apple, myrtle, etc. In the fig plant it encloses flowers and seeds.

Hypatia (c. 370–415). Daughter of the mathematician Theon of Alexandria. Lecturer on neo-Platonism and author of mathematical works, she was done to death by the people on suspicion of having incited the Roman governor of Egypt to persecute the Christians. Charles Kingsley used her life as the basis for his novel Hypatia.

Hyperbola (Gr. *hyper*, beyond; *ballein*, to throw). One of the sections of the cone. It is defined mathematically as the locus of a point which moves so that its distance from a fixed point, the focus, bears a constant ratio which is greater than unity to its distance from a fixed straight line called the directrix. See Conic Sections.

Hyperbolē (Gr. *hyper*, beyond; *ballein*, to throw). In rhetoric, a figure that expresses more than is warranted by the facts. Thus it implies exaggeration, as in expressions of admiration, fear, hatred; it may be used when it is desired to make things more intelligible as well as more impressive; or may be resorted to for comic effect. It calls for imagination, appreciation of the audience or the reader, and, to be effective, must possess a higher quality than mere exaggeration. Milton's lines in *Paradise Lost*, ii, 719:

So frowned the mighty combatants, that
hell
Grew darker at their frown

is a good example. Dryden's couplet on Charles II, in *Astraea Redux*:

That star that at your birth shone out so
bright,
It stained the duller sun's meridian light
is an example of fulsome adulation. An example of the comic effect of hyperbolē is in Voltaire's remark that the English gained two hours a day by clipping words. See Rhetoric.

Hyperbolic Functions. Mathematical functions having relations to a rectangular hyperbola similar to that of the ordinary trigonometrical functions sine, cosine, tangent, etc., to a circle. They are written \sinh , \cosh , \tanh , and can also be defined:

$$\begin{aligned}\sinh \theta &= \frac{1}{2} (e^{\theta} - e^{-\theta}), \\ \cosh \theta &= \frac{1}{2} (e^{\theta} + e^{-\theta}), \\ \tanh \theta &= \sinh \theta / \cosh \theta.\end{aligned}$$

The reciprocals are $\operatorname{cosech} \theta$, $\operatorname{sech} \theta$ and $\operatorname{coth} \theta$.

Hyperbolus (d. 411 B.C.). Athenian demagogue. Of humble origin, he made a fortune as a lamp-seller, and after the death of the rival demagogue, Cleon, gained such a hold over the populace that he was even appointed commander-in-chief. Like Cleon, he was the butt of the comic poets. His attacks upon Nicias and other prominent Athenians and his dishonest practices led to his banishment to the island of Samos, where he was slain during an oligarchical rising.

Hyperborei. In Greek mythology, a nation which was supposed to dwell beyond (*hyper*) Boreas,

the north wind. They dwelt in the utmost peace and happiness in a land of perpetual sunshine with soil of amazing fertility, and lived to a fabulous old age.

Hypercalcaemia (Gr. *hyper*; Lat. *calx*, lime). Condition in which too great a proportion of calcium, withdrawn from bones thus rendered brittle, circulates in the blood. It is due to a lesion of the parathyroid glands which control the calcium-phosphorous chemistry of the body. Pain and tenderness of the bones, often accompanied by spontaneous fracture, are the outstanding symptoms.

Hypergamy. Practice in stratified societies allowing a woman to marry a man of higher caste than herself and forbidding her to marry into a lower caste. It was most highly developed in India. Its chief effects are the restriction of inbreeding in the otherwise endogamous caste units, the restriction of opportunities for marriage for women of the highest castes, and emphasis on caste distinctions.

Hyperglycaemia (Gr. *hyper*, excessive; *glykys*, sweet). Condition in which the bloodstream contains too high a proportion of sugar. It occurs in *diabetes mellitus*. Too much sugar in the blood is a poison, producing coma, which can be relieved by insulin. The opposite condition, in which there is too little sugar in the bloodstream, is hypoglycaemia.

Hypericaceae. A family of herbs, shrubs, and trees native to the temperate regions, and the mountains of warm regions. They have opposite leaves, often with pellucid glands which give the appearance of minute perforations. The flowers are in clusters at the ends of shoots. S. John's-worts form the typical genus.

Hyperides OR **HYPERIDES** (c. 390–322 B.C.). An Attic orator. A supporter of Demosthenes in his anti-Macedonian policy, Hyperides was actively associated with the revolt against Antipater, the successor of Alexander the Great. His hopes were destroyed at the disastrous defeat of Crannon (322 B.C.), and he was shortly afterwards murdered by the agents of Antipater. His oratory was graceful and polished rather than vigorous. All his speeches were lost for centuries, but considerable fragments have been recovered, including one almost complete speech. This is For Euxenippus, which is the chief authority on the *eisangelia* or impeachment or state prosecution of officials of Athens.

Hyperidrosis. Excessive activity of the sweat glands. This may be general, or localised to the axillae, the palms of the hands, or the soles of the feet. General sweating in excess is a symptom of toxic invasion such as obtains in phthisis or typhoid fever, and characterises certain disorders of the nervous system. The underlying disease must be treated and general hygienic measures taken. Troublesome localised sweating may be treated with X-rays, measures to adjust the glandular balance of the sufferer, and disinfection of the sodden skin with spirit, mercurial, and other lotions to protect it from the invasion of bacteria, and the resulting smell.

Hyperion. In Greek mythology one of the Titans. He was the father of Helios, the sun, Selēnē, the moon, and Eos, goddess of the dawn. Hyperion is often confounded with Helios. See Titan.

Hyperion. Satellite of Saturn, discovered by Bond in 1848. Seventh in order from the planet, it is eighth in brightness, being only about 250 m. in diameter. It circulates at a mean distance of 922,000 m. from the planet in a period of 21 days 6½ hours.

Hyperion. Uncompleted poem by John Keats, first published in 1820. It was presumably intended to be a blank verse epic, but only the first two books—357 and 391 lines respectively—and 135 lines of the third were written. The theme is the overthrow of Saturn and the Titans by Jupiter.

Hypermetropia. Long sight, the condition in which parallel rays of light do not converge to a focus upon the retina, but tend to be brought to a focus behind that membrane. The condition occurs when the eyeball is too short or the cornea too much flattened. It can be corrected by the use of convex glasses. See Eye; Vision.

Hyperpiesia. Condition in which the blood pressure is persistently raised in the absence of any obvious kidney or arterial disease. See Hypertension.

Hypersthene. Rock-forming mineral, one of the orthorhombic pyroxenes. It is an iron magnesium silicate with more than 15 p.c. of the iron molecule, and grades into the iron silicate enstatite. Good crystals are rare, and hypersthene generally occurs as dark brown to greenish-black grains and masses in basic igneous rocks (norite, gabbro, etc.); in intermediate igneous rocks (andesite, etc.); in metamorphic rocks (charnockite, various crystalline schists and

hornfels). Hypersthene can be cut and used as a gem-stone.

Hypertension. High blood pressure. It may occur as a result of disease of the kidney or arteries (secondary hypertension) or may arise from no known cause (essential or primary hypertension). Essential hypertension may be benign or malignant. In benign essential hypertension (the commonest form) there may be no symptoms or the patient may suffer from headache, transient giddiness, palpitations, or undue fatigue; the course of this condition is long and in general the high blood pressure has little or no effect on the course of the patient's life. Malignant essential hypertension is more serious; it may arise spontaneously, or benign essential hypertension may pass into a malignant phase. The symptoms are severe, the course rapid, and signs of kidney damage soon appear.

High blood pressure causes a strain on the heart, which enlarges, and on the blood vessels. A stroke, due to the giving way of a cerebral blood vessel before the increased tension, may occur. In essential hypertension the patient should live within his capabilities, avoiding strenuous exercise, worry, and emotional stress; adequate rest is essential.

Hypertrophy. In medicine, enlargement of an organ or tissue beyond its normal size. Usually, this occurs in response to an increased demand made upon the organ or tissue; for instance, if one of the kidneys is removed the remaining kidney enlarges in order to take on increased responsibility. Similarly, the heart of the athlete enlarges in response to the increased demand upon the circulation resulting from abnormal muscular activity. Hypertrophy of an organ, e.g. the breast or tongue, sometimes occurs as a pathological process. Increase in the size of an organ is no guide to its functioning capacity, for the increase in size may be due to the presence of a greater number of structural cells and not to an increase of actively functioning cells.

Hypha. One of the thread-like units of which the vegetative body or mycelium (*q.v.*) of most fungi consists. When the spore of a fungus germinates it usually puts out a delicate, tubular, germ tube. This grows longer to become the first hypha, and it commonly branches many times to produce a spreading system of hyphae which is the mycelium. Hyphae are bounded by non-living walls within which cytoplasm, nuclei, and

vacuoles occur. In Phycomycetes (*q.v.*) they are normally coenocytic, i.e. without septa. In the higher fungi—Ascomycetes and Basidiomycetes—septa occur at intervals so that each hypha consists of a row of cylindrical “cells,” in which one, two, or more nuclei are found according to type.

Hyphen (Gr. *hyph*=*hypo*, under; *hen*, one). Name given to a short line, indicating the union of two words so as to form one compound, e.g. three-pronged. It is also used to show the connexion between two syllables of a divided word at the end of a line, or as an etymological guide to show the component parts of a word, e.g. in-ad-miss-ible. Hyphenated surnames, usually the result of marriage or adopted for convenience when a name is as common as Smith or Jones are rightly or wrongly considered in the U.K. a mark of social superiority.

Hypnotic (Gr. *hypnos*, sleep). Substance used to induce sleep. Among such substances are opium and its derivatives, which act by their power to negate pain; and the barbiturates, such as seconal and veronal, which act by direct effect on the sleep centre of the brain. They must be used with discretion and under the direct control of a physician, for a habit easily establishes itself. Barbiturates also spoil mental concentration, memory, and initiative if their use is continued over long periods. See Insomnia.

Hypnotism (Gr. *hypnos*, sleep). Artificial induction of a state, resembling sleep, the subject being specially open to suggestion. The degree of control possible depends upon the depth of the hypnosis, the personality of the subject, and the method used to induce the hypnotic state. In light hypnosis the patient may be aware of his surroundings, but is unable to move any muscle which he is told he cannot move. This is followed by a state (also found in catalepsy) when the limbs may be placed in any anatomically possible position and will remain there completely inert. In some cases anaesthesia occurs. When deep hypnosis is reached the subject seems to be asleep; after waking he remembers nothing of what took place unless ordered to do so, while he was in a state of hypnosis, and up to a point he will act and perceive as he is told. For example he will “see” objects which are not present, remain blind to those which are, run on all fours like a dog if he is told that he is a dog, etc. In some

subjects it is possible to produce bodily changes—*e.g.* of temperature—which are beyond their normal control. Forgotten events may be recalled, especially those of early childhood, and with them the emotions experienced at the time. Perhaps the most striking of these phenomena is that orders given during deep hypnosis will be carried out at the time suggested after the subject has awakened—the longest interval vouched for being a year.

Methods of Inducing Hypnosis

The methods used to induce hypnosis vary. The subject is made comfortable, asked to relax, and as a rule told to fix his eyes upon some bright object above eye-level in order to fatigue the muscles of the eye, which of itself creates a desire to sleep. In order that this may not be merely normal sleep the operator keeps in touch with him by a stream of suggestions—telling him that his limbs are growing heavy, that he feels drowsy, etc. Light rhythmical stroking of the limbs is also helpful. When the right moment arrives the subject is told that he cannot make some particular movement. Should he try and prove unsuccessful, hypnosis has been achieved. The hypnotist can adopt either a commanding attitude or one which asks for willing consent. The former may rouse resentment in normal persons, and this fact has led to the erroneous belief that only neurotics and invalids can be hypnotised. On the contrary, many doctors find that healthy outdoor types are easier to influence than nervous people. Nor does the control gained by domineering methods seem to last so long as that achieved by friendly approach.

It is not possible, apparently, to hypnotise anyone wholly against his will; but far less cooperation is needed in mass hypnosis than when dealing with an individual. Nor can the subject be compelled to perform actions which are deeply repugnant to him. A man who will strike an onlooker with a cardboard dagger will wake when a real weapon is put into his hand; most people wake when told to do something humiliating. But should a patient possess a strong, unconscious desire barely kept in check in ordinary life to perform a suggested action, then the order of the hypnotist may tip the scales. For this reason precautions must be taken before dangerous suggestions are made; and unqualified persons should not experiment, therefore, with hypnotism.

The hypnotist's orders begin to lose their force when the patient is no longer in touch with him, and hypnotism, therefore, finds less favour than it did with psychoanalysts. It can be used to get rid of hysterical symptoms; but unless the neurosis causing the hysteria is dealt with, other and perhaps more burdensome symptoms may replace those banished. Surgical operations have been successfully performed upon hypnotised patients; and though some patients cannot be placed under deep hypnosis, it is increasingly used in medicine as an anaesthetic, particularly in obstetrics. It explains many cures wrought by faith-healers.

An Act of parliament was passed in 1952 giving local authorities in England power to control hypnotism at entertainments because of its possible deleterious effects.

Hypnum. Genus of mosses of the order Bryales and of the section Pleurocarpi. In them the spore capsules are produced from the sides of the stems and branches. The very numerous species are known familiarly as feather-mosses, which well describes the branching, trailing growths of many forms. They grow on the trunks and roots of trees, rocks, old walls, and moist banks in all parts of the world. The capsules are nodding, more or less curved or irregular, and the teeth (peristome) guarding the mouth are in a double series.

Hypo. Name commonly used for sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$), incorrectly referred to as sodium hyposulphite. See Photography; Thiosulphuric Acid.

Hypocaust (Gr. *hypo*, under; *kaiein*, to burn). Shallow heating chamber or channel beneath baths and dwelling-rooms, much used in Roman Britain. Invented by Sergius Orata (c. 100 B.C.), and used in Italy mainly for public baths, the system was, because of the colder climate, widely applied to Romano-British houses.

From an external furnace (*hypocaustis*) the hot gases, in the simplest type, passed through a channel to a wall flue, usually of box tiles. In a second type they passed to a central hollow whence branches led to flues in the sides and angles of the walls, as at Silchester. The most frequent type, as at Caerwent, was a chamber beneath the living-room, supported by rows of pillars about 30 ins. high and 18 ins. apart, often bearing mosaic pavements, as for example, at Woodchester, Gloucestershire, and Brading, I.O.W.

Hypochlorite. Compound of hypochlorous acid. Hypochlorites are characterised by their instability, chlorides and chlorates being formed when solutions are boiled. Calcium hypochlorite, formed when bleaching powder is dissolved in water, is the most important hypochlorite, and is much used as a bleach.

Hypochlorous Acid (HClO). Acid formed when dichlorine monoxide (Cl_2O) is dissolved in water. It is not known in the pure state. The solution can be prepared by shaking chlorine water with mercuric oxide, when the oxide dissolves and the solution clears. The liquid is then distilled to separate the hypochlorous acid from the mercuric chloride which was formed. Hypochlorous acid is a powerful bleaching agent, *e.g.* applied to ink-stains, it immediately removes them, and if the material is afterwards washed no corrosion results.

Hypochondriasis. The morbid anxiety of a person as to the state of his health. It is derived from *hypochondrium*, the part of the abdomen in which is situated the spleen, since this organ was formerly believed to be the seat of the disorder. Sufferers fear that they are afflicted with, or are specially vulnerable to, some disease. An attack of indigestion convinces them that they have cancer of the stomach, or a cough that they have tuberculosis.

The condition is a neurosis, and treatment consists in the discovery, by psycho-analysis or other appropriate methods, of, and the taking of steps to relieve, the underlying condition giving rise to the affection.

In some patients hypochondriasis is a symptom of serious mental imbalance.

Hypodermic Injection (Gr. *hypo*, under; *dermos*, skin). The injection of a solution of a drug by a hypodermic syringe and needle under the skin. A subcutaneous injection is given into the soft tissues immediately under the skin. Intramuscular injections are given into a muscle, and intravenous injections into a vein; such injections are useful when rapidity of action of a drug is desirable, where swallowing is difficult, or where absorption from the gut is impeded.

Hypogene (Gr. *hypo*, under; *-genēs*, born). Name given to ore deposits which have been formed by ascending waters. Such waters, called hypogene waters, carry mineral-forming ingredients which are unloaded whenever the ascending

solutions encounter conditions favourable to deposition. See Ore Deposits; Supergene.

Hypogeum (Gr. *hypogaios*, underground). An underground chamber designed for occupation, refuge, storage, or burial. Ancient classical writers used the term of vaulted cellars in dwellings, temple treasuries, mines, and tombs. Many inhabitants retired to their hypogea during the eruption which destroyed Pompeii in A.D. 79. Archaeologists restrict the term to sepulchral chambers. They may be (1) earth-dug, e.g. the Neolithic grottoes of the Marne, the Homeric graves of the Troad, and numerous examples in S.E. Russia; (2) rock-cut, e.g. the Syracusan quarries, the Roman catacombs, the great Maltese hypogeum of Halaşfieni, and Han sepulchres in Szechwan; (3) masonry, as in Mycenae, Lycia, and some Roman columbaria. They were sometimes richly adorned with paintings, as in Egypt, Cervetri in Etruria, and Marissa in Palestine; sometimes with external decorations, as at Petra in Arabia.

Hypoglossal Nerve (Gr. *hypo*, under; *glōssa*, tongue). Nerve passing out from the brain through a small aperture in the base of the skull. It takes a curved course downwards and forwards to the tongue, and gives off branches supplying the tongue and its immediate muscles.

Hypoglycaemia (Gr. *hypo*, under; *glykys*, sweet). Condition in which the blood stream contains too low a proportion of sugar. It is most often associated with overdosage of insulin combined with wrong food-intake in the diabetic patient. Symptoms vary from tremor, sweating, and malaise, to deep coma, and are relieved by sugar intake. Medicine recognizes an idiosyncratic hypoglycaemia associated with fatigue and depression, the cause being unknown. Hypoglycaemia is also sometimes intentionally induced by injections of insulin in cases where patients, otherwise physically normal, will not eat, owing to some neurosis; the lowering of sugar content in their blood causes an irresistible craving for sugar, which induces them to eat, e.g., suet pudding with golden syrup.

Hypophosphorous Acid. As used in commerce, a clear liquid containing 30 p.c. of the pure acid (H_3PO_2). It is best prepared by dissolving barium hypophosphite in water and adding dilute sulphuric acid until turbidity ceases. The liquid is then filtered

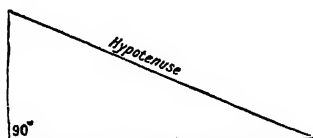
from the precipitate. It is used in the manufacture of iron hypophosphite, from which other hypophosphites used in medicine are made.

Hypostasis (Gr. *hypo*, under; *stasis*, standing, substance). In theology, the hypostatic form is the essential constitution of each of the three persons of the Trinity; the hypostatic union is the union of the two natures in Christ. According to the neo-Platonists, God appears in three states or hypostases: unity, intelligence, soul. See God.

In medicine, hypostasis means excess of blood in the organs.

Hypotension. Low blood pressure, the opposite of hypertension (*q.v.*), or high blood pressure. In normal healthy individuals there is a wide variation in the state of the blood pressure, and the incidental finding in the course of a medical examination of a condition of low blood pressure is usually of no significance. But occasionally low blood pressure causes undue fatigue and attacks of giddiness. Unless the low blood pressure is giving symptoms, no treatment is indicated; otherwise a convalescent holiday is often beneficial to the patient.

Hypotenuse (Gr. *hypoteinousa*, subtending line). Term used in mathematics for the side of a right-angled triangle opposite the right



Hypotenuse. Diagram showing the hypotenuse in a right-angled triangle, opposite the angle of ninety degrees

angle. By Euclid's 47th proposition, known as the theorem of Pythagoras, the square on the hypotenuse is equal to the sum of the squares on the other sides of the triangle.

Hypothec. In Scots law, a right of security enjoyed by a creditor for a debt due to him, the property covered by the security not being in the possession of the creditor. The landlord's right, when rent is due, to seize furniture and other chattels on the premises let is an example of hypothec. Hypothec is distinguished from a lien, which is a right to retain property already in the creditor's possession.

Hypothermal Deposits (Gr. *hypo*, under; *thermos*, warm). Geological term used in the classification of ore deposits (after Lindgren). The large group of ore deposits genetically related to igneous rocks has been subdivided according to mineral assemblages and geo-

logical associations. The hypothermal deposits form one member of the hydrothermal series, and are considered to have been formed from ascending thermal solutions at a relatively great distance below the surface, where the temperature was high (say 300–500° C.) and the pressure was very great. Examples of hypothermal deposits are to be found in certain gold-quartz veins (as in Ontario, South Dakota, Western Australia, etc.); in copper-tourmaline veins (Braden, Chile); and in lead-silver-zinc deposits (Broken Hill, New South Wales, and the Sullivan Mine, British Columbia).

Hypothermal deposits are generally associated with plutonic rocks such as granite, granodiorite, and diorite. The deposits are characterized by a massive texture and considerable wall-rock alteration and replacement; they often occupy shear-zones and the veins may be very persistent and regular. Metals in them may include tin, tungsten, molybdenum, gold, copper, lead, and zinc; while the common gangue minerals are quartz, tourmaline, chlorite, topaz, garnet, spinel, and sometimes amphibole and pyroxene. See Hydrothermal Deposits; Ore Deposits.

Hypothesis (Gr. *hypo*, under; *thesis*, placing). A word meaning supposition. Its simplest form is the hypothetical judgement (if A is, B is), in which the validity of the conclusion depends upon that of the major premise. In the narrower sense, an hypothesis is a general assumption, the provisional acceptance of a law, the existence of which cannot at the moment be proved, in order to account for a natural phenomenon. See Logic.

Hypsipylē. In Greek mythology, daughter of Thoas, king of Lemnos. Aphrodite, finding her altars in Lemnos neglected, avenged herself by making the Lemnian women offensive to their husbands, with the result that the husbands neglected them for Thracian slaves. Enraged at this neglect, the Lemnian women resolved to kill all the males in the island, Hypsipylē alone refusing to kill her father. *Pron.* Hip-sippi-lee.

Hypsometer (Greek *hypsos*, height; *metron*, measure). Apparatus for measuring the temperature at which water boils, in which care is taken that the thermometer bulb is clear of the water surface but as much of the stem as possible is heated directly by the steam. As the pressure of the air affects the temperature at which water boils, it follows that a determination of the boiling point of water indicates

precisely the atmospheric pressure. Travellers and explorers therefore use a hypsometer to check their readings of an aneroid barometer. From the records of the pressure changes which occur during the ascent of a mountain, travellers estimate the heights above sea level of the places where the barometer or hypsometer was read.

Hypsometers have been used for calculation of the variations in the force of gravity at sea. The hypsometer gives a reading from which the air pressure or height of the barometer can be calculated. The mercury barometer gives the pressure directly, and the two readings should be equal. Since the latter is affected by gravity, and the hypsometer is not, there is a difference due to gravity.

Hypsometry is the art of measuring heights on the earth's surface. Such heights are measured by means of trigonometrical survey, by running a series of levels starting from mean sea level and ending at the point whose height is to be measured, and by readings of the barometer. The latter method is approximate only.

Hyracotherium (Gr. *hyrax*, mouse; *thērion*, small wild beast). Extinct four-toed ungulate mammal, an early ancestor of the horse (*q.v.*). The size of a fox, it was related to Eohippus. Remains are found in the lower Eocene deposits of Europe and N. America.

Hyrax. Group of small ungulate mammals found in Africa, Arabia, and Syria. In appearance



Hyrax, an African mammal

they are not unlike rabbits without the long ears; but they belong to the hoofed group, and in spite of their small size come zoologically near the horses. They are the animals called conies in the Bible. There are about 20 species, and they live in holes and feed upon leaves and young shoots. Their toes are protected by broad nails or hoofs, and they are expert climbers. They are about 20 ins. long, and their short fur is brown.

Hyrcaus I, JOHANNES (d. 105 B.C.). King of Judaea and high priest of the Jews. Son of Simon

Maccabaeus, he withstood the opposition of Ptolemy, who murdered his father and his two brothers. He threw off the yoke of Syria, extended his kingdom over Samaria and Idumea, destroyed the rival temple on Gerizim, and, entering into an alliance with the Romans, founded the monarchy which continued in his family until the time of Herod.

Hyrcaus II (d. 30 B.C.). Maccabean king of Judaea. Son of Alexander Jannaeus and grandson of Hyrcanus I, and a man of weak character, he became high priest on the death of his father, and king of Judaea on the death of his mother, Salome Alexandra (d. 69 B.C.). He was forced by his younger brother Aristobulus II to resign both the office of high priest and the kingship. The contest brought Pompey to Jerusalem, 63. Pompey defeated Aristobulus and restored Hyrcanus to the high priesthood, in which he was confirmed by Caesar, 47, who made him a nominal ruler with Antipater, the Idumean (d. 43), who was made procurator of Judaea in 46, and used Hyrcanus as a tool.

When Judaea was invaded by the Parthians in 40, Hyrcanus was taken prisoner, had his ears cut off, and was carried off into Seleucia, his son Antigonus (beheaded by order of Antony, 37) being made king. Invited later to return to Jerusalem, Hyrcanus was put to death by order of Herod, son of Antipater, on a charge of treason. Herod married Hyrcanus's beautiful granddaughter Mariamne (*q.v.*). See Josephus's *Antiquities* and *Wars of the Jews*.

Hyrieus. In Greek mythology, the son of Poseidon and king of Hyria in Boeotia. It is said that a treasure house was built for him by Agamedes and Trophonius, containing one movable stone which allowed them to enter the treasury and rob it at their will. A trap was laid for them by Hyrieus, and to save himself Trophonius cut off his brother's head and fled to Lebadea, where he was swallowed up by the earth.

Another Hyrieus or Hyreus, a prince of Tanagra, and son of Neptune and Alcyonē, besought the gods to give him a son without marrying again, as he had promised his first wife to remain single after her death. The gods granted his prayer and directed him to put water in the hide of a bull, and bury it in the ground for nine months. At the end of that time Hyrieus opened the ground, and therein he found the promised

child in the bull's hide whom he called Orion (*q.v.*).

Hyslop, JAMES (1798–1827). A Scottish poet. Born at Damhead in Dumfriesshire, July 23, 1798, he taught himself French and Latin and a certain amount of mathematics, and while engaged as a shepherd began contributing to the *Greenock Advertiser* under the pen-name of The Muirkirk Shepherd. In 1818 he opened a school at Greenock and wrote for *The Edinburgh Magazine*. Faced with unexpected financial difficulties, he sailed to South America on H.M.S. *Doris*, and described the voyage in *The Edinburgh Magazine*. On his return he became a reporter for a short while in London before sailing as a tutor on H.M.S. *Tweed*. He died October, 1827, of fever near the Cape Verde Islands, and was buried at sea.

Hyslop's complete poems were published at Glasgow in 1887. His famous poem *The Cameronian's Dream* appeared in *The Edinburgh Magazine* in 1821, and was set to music by Hamish McCunn. See *Poems by James Hyslop*, with a sketch of his life, P. Mearns, 1887.

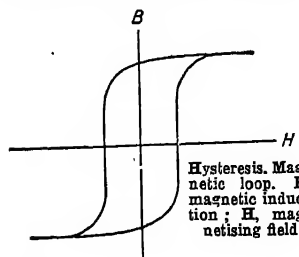
Hyssop (*Hyssopus officinalis*). Aromatic evergreen shrub of the family Labiatae. A native of the Mediterranean region, it has elliptic or lance-shaped leaves, and bluish-purple flowers in whorls; it was formerly used in medicine as a carminative.

It is not the hyssop of Scripture, which has been identified as the caper plant (*Capparis pinosa*).

Hystaspes (6th century B.C.). Ancient Persian prince. He was the son of Arsames and father of Darius I, in whose reign he was governor of Parthia. Hystaspes is the Greek form of the Persian name Vishtaspa, which was also borne by a much earlier ruler in Bactria or Sogdiana, the patron of Zoroaster (*q.v.*). This prince (c. 1000 B.C.) plays a part as Kai Gushtasp in medieval Persian romance, notably in Firdausi's *Shāh-Nāme*, and has been erroneously identified with Darius's father. Another Hystaspes was a son of Darius I. *Pron.* Hiss-tas-pee.

Hysteresis (Gr. *hysterein*, to come later or behind). Term used in physics for a lagging or retardation of effect when the forces on a body are changed. The name was given to a magnetic phenomenon observed by Warburg in 1881 and independently by J. A. Ewing in 1886. When any substance is magnetised by an electric current it is found that the properties acquired owing to the magnetism

lag behind the magnetising force. The strength of the magnetism in an iron bar, for example, is not the same for the same strength of current when the latter is increasing as it is when decreasing. This fact is illustrated by the typical hysteresis loop shown in the dia-



gram, the area of the loop being a measure of the energy lost per cycle. The energy lost is compensated for by a rise in temperature of the magnetised substance, and for that reason in electrical generators and transformers iron and steel are used with as low hysteresis as possible. If the full current of electricity is applied suddenly to magnetise a bar of iron, the latter does not immediately reach its greatest magnetic power, and this is another form of hysteresis.

Hysteria (Gr. *hysteria*, womb). A psychoneurosis. Ancient physicians believed that the symptoms were caused by the wandering of the womb about the body. The condition is commoner in women than in men, its manifestations—spasms, convulsions, fits of uncontrollable laughter, tremors, anaesthetic areas, loss of voice and of appetite, etc.—being more frequent about the time of the monthly period. Ideas control the body and produce morbid alterations in function. The manifestations do not occur during sleep or, it seems, when the patient is alone, since she never hurts herself. The symptoms can mimic every known disease, but never completely fill the diagnosis of any.

The hysterical personality is well recognized in medicine; it is characterised by lack of stability and of a standard of behaviour, and by the childlike ability to live in fantasy, with childlike need to attract notice and gain sympathy. Psycho-analysis finds the onset of hysteria associated with some particular shock or strain. It is argued that in every case of hysteria there is a past history of inability to make a normal adjustment to environment. Possibly in early life the patient has been

incapable of tolerating some sexual wish on account of the anxiety it caused, and has repressed it. This has produced a state of mental conflict so intense that when the patient seeks to deal in the same way with later shocks and strains, his or her powers of repression fail, and some hysterical symptom results. The stronger the predisposition the smaller the shock necessary to precipitate the illness. Freud's view is that the symptom both symbolises the repressed fears and wishes in a form unrecognized by the sufferer, and affords relief from the anxiety produced by the underlying conflict, e.g. war paralyses disable men from fighting; skin eruptions render a woman unattractive so that a marriage which is unconsciously dreaded must be postponed. For this reason hysteria is classified by Freudians as a defence neurosis.



The cure is in the hands of the physician, who must arrange the pattern of living against a stable background, and of the psychologist who understands and treats these maladjustments of mind, rather than in the prescribing of drugs. The subject is discussed in the first volume of S. Freud's *Collected Papers*.

Hysteriaceae. Minute fungi of the family Ascomycetaceae, of a carbonaceous or membranous texture, growing on old wood, bark, and dry leaves. The spore-bearing body (ascocarp) bursts through the integuments of its host in an elongated black form and opens by a longitudinal narrow slit. The ascii or spore cells are club-shaped and contain four or eight spores.

Hythe. A municipal borough and holiday resort of Kent, also one of the Cinque Ports. It is 67 m. S.E. of London and 4 m. W. of Folkestone.

Among the principal buildings of interest are the church of S. Leonard, with a beautiful chancel; the town hall; the hospital of S. John, originally for lepers, built in the 13th, 14th, and 19th centuries; and the medieval hospital of S. Bartholomew. Under S. Leonard's church is a crypt with a collection of human skulls and bones. Part of the royal military canal is in Hythe. In the neighbourhood are Saltwood, Shorncliffe, and Lympe (qq.v.), also Romney Marsh.

Hythe was a seaport and borough before the Norman conquest.

It was governed by a bailiff and jurats before it received the right to have a mayor in 1575. Its importance as a seaport declined as the harbour became blocked by sand, but as a seaside resort and residential retreat it became popular. In 1854 a school of musketry (later the school of infantry) was established here.



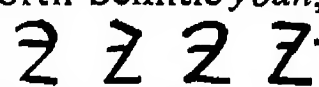

Hythe, Kent. Parish church of S. Leonard, from the N.E. of this town, one of the Cinque Ports. Above, the crypt under the chancel of S. Leonard's: it contains thousands of skulls of unknown origin

During the Second Great War Hythe was a control centre for anti-aircraft artillery deployed against German flying bombs. Pop. (1951) 9,218. Folkestone and Hythe is the name of a co. constituency.

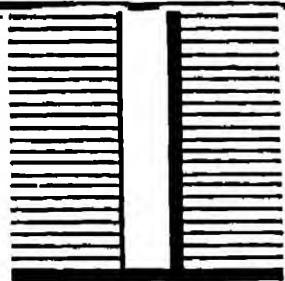
Another Hythe, in Hampshire, England, is a yachting centre. It lies on the W. of Southampton water, 2½ m. S. of Southampton.



Hythe arms

I, THE ninth letter of the English alphabet, descended from the North-Semitic *yōdh*, the form of which was . This form was conveyed into the earliest of the Greek alphabets as .

forms which were later simplified and straightened into the single stroke (I) of the capital *i* used to-day. In the early square Hebrew alphabet (the parent of the modern Hebrew alphabet) the symbol



came to be written with a very small sign; hence the English words "jot" (see Matthew, v. 18) and "jottings," meaning little notes. The minuscule *i* is a smaller form of the capital, to which at a later stage a dot was added: this was an innovation introduced in 11th-century cursive writing for the sake of clarity where the letter *i* fell in close proximity to *n* or *m* or to another *i* or to a *u*, e.g. in such a word as *inimicis*.

I Ninth letter and third vowel of the English and Latin alphabets. In English it has two sounds, long as in *mine* (really a diphthong); short as in *pin*, this being the short sound of the Italian long *i* heard in *machine*. The combination *ia* represents *ya*, as in *Christian*, or short *i*, as in *marriage*. *Ie* represents long *e*, the Italian long *i* sound heard in *brief*, *grief*; the diphthongal *i*, as in *pie*; short *i*, as in *sieve*; or short *e*, as in *friend*. *Io* is pronounced as two syllables when *i* is accented, as in *violet*. The endings *-sion*, *-tion*, have a sound midway between *-shon* and *-shun*, unless *s* precedes, when *t* keeps its normal sound, as in *question*.

Iacchus (Gr. *Iakchos*). In Greek mythology, a mystic deity who played an important part in the Eleusinia (*q.v.*). Later, he was confused with the younger Dionysus, the son of Zeus and Demeter (or Persephonē), the elder being the son of Zeus and Semelē. *Iacchus* was also the name given to the song sung in his honour at festivals. See *Bacchus*.

Iago. Second leading male character in Shakespeare's tragedy *Othello*. He is an ancient, or sergeant, under Othello the Moor, and is filled with envy of his chief's reputation and position and that of Cassio, a lieutenant. Iago plays on Othello's passionate jealousy to suggest that Desdemona, Othello's wife, has committed adultery with Cassio, thus hoping to destroy them all. The most ruthless and cunning villain drawn by Shakespeare, Iago also has moments of comedy and is often played by the principal actor of a company.

Iambic Verse (Gr. *iaptein*, to assail). Lines containing a number of feet each of which is an iambus or foot of two syllables, the first unaccented or short, the second accented or long. Iambic hexameter is the form of Greek tragedy. Iambic verse is peculiarly adapted to the English language. Rhymed or unrhymed iambic pentameter is the verse of Chaucer, Spenser,

Shakespeare, Milton, Dryden, and Pope. Iambic tetrameter, or octosyllabic verse, was favoured by Scott, Coleridge, and Tennyson (for *In Memoriam*).

Iambic trimeter is also used by English poets, often in association with the iambic tetrameter. In one measure or another iambic is by far the most usual kind of verse in English.

Iamblichus (d. c. A.D. 330). Neo-Platonic philosopher. Born at Chalcis, in Coele-Syria, he was the founder of the Syrian school of neo-Platonism, or rather neo-Pythagoreanism, his philosophy being based mainly upon mystical numerical speculations. He taught the theory of emanations, and in addition to the three divine substances of Plotinus (*q.v.*) introduced a number of secondary triads. His life of Pythagoras, discourses exhorting to philosophy, two mathematical works, and one on mysteries, are extant.

Another Iamblichus (2nd century A.D.), a native of Syria and a romance writer, was the author of *Babyloniaca*, an interesting love-story, an abstract of which is preserved in Photius (*q.v.*).

Iana or **YANA**. River of Asia, in the Yakutsk A.S.S.R., R.S.F.S.R. It rises in the Verkhoyansk Mts. to the N. of the lower course of the Lena, and running for 600 m. from S. to N., falls into the Arctic Ocean at Murakh. The chief affluents are the Shemanova, Dulgalak, Aditcha, and the Butyntai. The country through which it flows is desolate, the only places of note being Verkhoyansk and Ustyansk.

Ianthē. Name applied by Walter Savage Landor, in various poems addressed to her, to Sophia Jane Swift, an Irish girl he knew while residing in Bath c. 1805-08.

Ianthina (Gr. *ianthinos*, violet-coloured). Member of the family Ianthinidae, marine gastropod molluscs with thin violet shells, which float on the surface of the sea. These molluscs form a curious floating egg-raft of air bubbles entangled in the slime from their

bodies. The eggs are deposited on the under side of this raft, which is kept attached to the foot of the animal as it floats. It inhabits the warmer seas; but the shells of four species have been found on the coast of Cornwall.

Iapetus. In Greek mythology, one of the Titans. When this race of giants had been defeated by Zeus, Iapetus was imprisoned in Tartarus. See *Titan*.

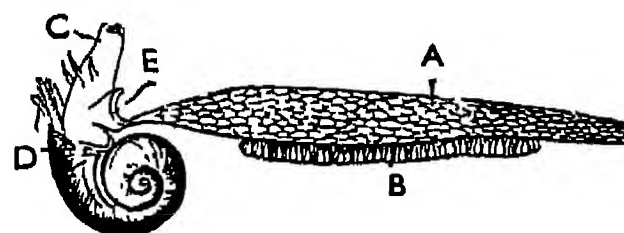
Iapetus. Eighth moon of Saturn counting outwards from the planet. Discovered in 1671 by J. D. Cassini, it fluctuates considerably in brightness, and takes a little over 79 days to travel round its orbit.

Iapygia. Name given by the Greeks to the S.E. peninsula of Magna Graecia, S. Italy. It corresponds to the modern prov. of Lecce, in the heel of Italy. The Romans called it Apulia.

Iasi. Rumanian city the name of which is usually spelt in English Jassy (*q.v.*).

Ibadan. District of Nigeria, in the Western Region. The country generally is rolling plateau, with low hills and fair pastoral and agricultural land. The principal means of communication are the main roads, Ibadan-Oyo, Ibadan-Ilesha, and Ibadan-Ijebu Ode, and the main Iddo-Kano rly., which passes through the chief towns of Ileigbo, Iwo (pop. 1953, est. 100,000), Lalupon, and Ibadan (459,000). The oil-palm flourishes and constitutes the chief wealth of the country. Yoruba is the local language, and the ruler is called the *bale*. In 1886, when Great Britain enforced peace in the area, Ibadan formed an integral part of Oyo.

Ibadan town lies 119 miles by railway N.E. of Lagos. It has a



Ianthina fragilis. A, float; B, ova; C, proboscis; D, branchiae; E, foot



Derek Ibbotson winning the mile, July 19, 1957, at the White City, London, in a new world record time of 3 mins. 57.2 secs.; behind him are Roger Delaney (Irish Republic), 3 mins. 58.8 secs.; S. Jungwirth (Czechoslovakia), 3 mins. 59.1 secs., and K. Wood (U.K.), 3 mins. 59.3 secs.

university college established in 1947; new buildings were opened in 1952 by Lord Tedder. It trades in palm oil and kernels, cotton products, kola nuts, and hides.

Ibagué OR SAN BONIFACIO DE IBAGUÉ. A town of Colombia, capital of the dept. of Tolima. It stands in a productive plain, at an elevation of 4,100 ft., 125 m. W. of Bogotá, and is noted for its hand-made leather goods and a local drink, *mistela*; it deals in the semi-tropical and temperate products of the locality. There are thermal springs and sulphur mines near by. Pop. (est.) 115,000.

Ibañez, V. B. See Blasco Ibañez, Vicente.

Ibarra. A city of Ecuador, S America, capital of the prov. of Imbabura. It stands on the small river Tahuando, at the N. base of the volcano Imbabura, among fruit plantations and gardens, 58 m. N.N.E. of Quito. Motor road and rly. connect it with Quito. At an elevation of 7,300 ft., it enjoys an equable, moist climate. It manufactures rope, lace, and Panama hats. Distilling is carried on, and there are woollen and cotton mills. Pop. (est.) 12,000.

Ibarra was founded by a Spanish governor in 1597, after the defeat of the Incas. There are many Inca battlefields in the neighbourhood, which abounds in Indian burial places. Often threatened by volcanic action, it was almost entirely destroyed in an earthquake in 1868 and was rebuilt in colonial style.

Ibbotson, GEORGE DEREK (b. 1932). British athlete. Born June 17, 1932, at Huddersfield, he qualified as an electrical engineer. A distance runner from his schooldays, he first came into prominence in 1955 with good performances at 3 m. and 6 m. In 1956 he won an Olympic Games bronze medal in the 5,000 metres, ran the mile in under 4 mins., and became A.A.A. 3-m. champion by beating Chataway. In 1957, in a mile race in which the first four all finished in under 4 mins., he set up a new world record of 3 mins. 57.2 secs.; and in the same year he created a new British record for the 3 m. (13 mins. 20.8 secs.).

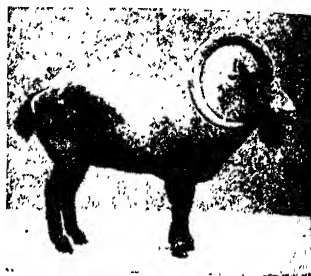
Iberia. Name given by the Greeks to the S.W. peninsula of Europe, called by the Romans Hispania. Probably the term referred to the country by the Ebro (Lat. Iberus), inhabited by a people called Iberians, the earliest inhabitants of S.W. Europe of whom there is definite information. Intermingling with Celtic invaders occurred. Living representatives are the Basques. Spain and Portugal together are still referred to as the Iberian peninsula.

The name Iberia was also borne by the region between the Caucasus and Armenia corresponding to modern Georgia. Its inhabitants, the ruling classes of whom belonged to an Iranian stock, were occupied chiefly in agriculture. Nominally forming part of the Roman empire from the time of Trajan, the country came under Persian rule after the unsuccessful campaign of the emperor Julian against Sapor in 363.

Iberian Mountains. A name sometimes given to the mts. of central and E. Spain, particularly the ranges which include the Sierra de Guadamarra and those S. of the river Ebro.

Iberian Sea. Name given to the westernmost portion of the Mediterranean, lying between Spain (the anc. Iberia) on the N., and Morocco and Algeria on the S.

Ibex (Lat.). A small group of wild goats. It includes some four species, all distinguished by fine upstanding, curved horns. The Alpine ibex (*Capra ibex*) is almost extinct in the wild state, though a few herds are preserved by the Italian government. This species has horns over 40 ins. long. The Asiatic ibex (*C. siberica*), which inhabits the mountain ranges of central Asia, is brown to white in colour, about 40 ins. high at the shoulder, and sometimes has horns over 50 ins. long. The Arabian



Ibex. Specimen of the Asiatic variety. *Capra siberica*

ibex (*C. sinaitica*) is yellowish brown, with dark markings, and is found in the Levant and in Egypt, in the hills between the Nile and the Red sea, as well as in Arabia. The Abyssinian ibex (*C. waliae*) is much darker, and has black horns with a curious prominence on the forehead.

Ibibio. A Negro cultivating people in the Calabar coastland, between the Cross and Kwa-Ibo rivers. Numbering some 800,000, they are the second largest linguistic unit in S.E. Nigeria.

Ibicuy OR IBICUI. River port of Argentina, in the prov. of Entre Rios. It stands 70 m. above the confluence of the Uruguay with the Paraná. Here trains from Buenos Aires to the N. cross by ferry the river Paraná (4-5 hrs.).

At another Ibicui, in Paraguay, iron mines have been exploited since 1863 and manganese ore deposits occur.

Ibi-Gamin OR KAMET. Mt. of the Himalayan system, on the frontier of Tibet and the Uttar Union, India. It lies in lat. 30° 35' N., and long. 79° 39' E., N.W. of the gigantic Nanda Devi. The neighbouring pass of the same name attains an alt. of 20,460 ft. The peak rises to 25,447 ft.

Ibis (Gr., Lat.). Group of wading birds, nearly related to the storks, but distinguished by their very long, curved beaks. Numerous species are found in the warm countries of both hemispheres, The Egyptian ibis (*I. aethiopica*),



Ibis. The Egyptian ibis, once an object of worship

worshipped by the ancient Egyptians, is now rare in Lower Egypt, but common from the Upper Nile to the Cape. Its mummied remains are often found in ruined temples. The glossy ibis (*I. falcinellus*) breeds in S. Europe, and is occasionally found in Great Britain.

Ibn Saud (1880–1953). King of Saudi Arabia. Born at Riyadh, capital of Nejd, he was the eldest son of Abdul Rahman, heir to the throne of Nejd; his full name being Abdul Aziz ibn Abdul Rahman al-Faisal Al Saud. When the Turks seized Riyadh in 1891, he went with his father to exile in Kuwait. In 1901 Abdul Rahman abdicated all rights to the throne in favour of his son; and the latter set out on an expedition against



Ibn Saud, king of Saudi Arabia

Ibn Rashid, the ruler. He took the fortress of Nejd with only 15 men; Ibn Rashid escaped, and Ibn Saud was proclaimed ruler of Nejd. With victory over the Turks and the death

of his rival, he was left from 1906 in undisputed authority.

His policy was to weld the tribes of Arabia into one nation, and he founded communities where the people lived instead of camping as nomads in the desert. Puritan in outlook, he was called the Cromwell of the Hejaz. In 1913 he formed a standing army and drove the Turks from Eastern Arabia. Apart from an indecisive battle at Jarrab in 1915, he took no action against them in the First Great War until the autumn of 1918. Meanwhile King Hussein of the Hejaz by cooperation with T. E. Lawrence had put himself in a strong position in the peninsula. The two inevitably came into conflict, and in spite of British support, Hussein was decisively beaten by Ibn Saud at Hofuf in 1919.

In 1924 Ibn Saud invaded the Hejaz, Hussein abdicated, and evacuated Mecca, which was occupied by Ibn Saud's Wahabis. On Jan. 8, 1926, Ibn Saud was proclaimed king of the Hejaz, and a year later changed his title to king of the Hejaz, of Nejd, and its dependencies. In 1932 he announced the formation of the combined kingdom of Saudi Arabia.

Friendly relations were established with Great Britain by the treaty of Jedda in 1927, but were marred by a dispute over the building of forts by the government of

Iraq on the borders of the two countries. Although the Wahabis are fanatical Muslims, with a strongly conservative outlook, Ibn Saud was a progressive ruler, making great use of motor transport and radio. His closing of the Hejaz railway had political rather than reactionary motives. In 1938 he began to raise a large standing army on modern lines. During the Second Great War, Ibn Saud broke off relations with Italy, but his country remained neutral. He made it a member of the Arab League (*q.v.*). The eldest of his 32 sons became viceroy of Nejd. He died at Riyadh Nov. 9, 1953, and was succeeded by his eldest son Saud Ibn Abdul-Aziz (b. 1902).

Ibo or **IGBO**. Negro people in S.E. Nigeria. Estimated at 3,000,000 to 3,500,000, if allied tribes are included, they occupy some 20,000 sq. m. from the Cameroons border, N. of the Efik and Ibibio country, and across the Niger to Benin. Varying in skin colour from light olive to ebony, they practise body-painting and scar tattooing. They are mainly subsistence farmers, yams and cassava being the staple crops, though some produce yams and rice for trade. Their huts are adorned with carvings and mud-modellings. Their woodcarving is of high quality. The Ibo language, one of the Kwa group, includes a great diversity of dialects.

Ibrahim Pasha (1789–1848). Egyptian soldier. Born at Kavala, in Thrace, he was adopted by Mehemet Ali, according to report his father, who had established himself as a virtually independent ruler in Egypt. Brought up as a soldier, Ibrahim put down



Ibrahim Pasha, Egyptian soldier

a rising of Arabs in upper Egypt in 1810, and subjugated the Wahabis in Arabia after a war during 1816–18. In the campaign against the rebelling Greeks, 1824–28, he captured Navarino, Tripolitza, and Missolonghi, 1826. After Mehemet's fleet was destroyed at Navarino in 1827, Ibrahim retired from the war.

When Mehemet decided to annex Syria in 1831, Ibrahim captured Gaza and Acre and overran the country. In 1832 the Powers stepped in, and a treaty was signed by which Mehemet received

Syria. Ibrahim was appointed governor, but his exactions led to revolts, and in 1838 Turkey renewed the war. After his victory of Nezib, June 24, 1839, the Powers again interfered, and he evacuated Syria in Feb., 1841. Regent in Egypt for some months in 1848, owing to the mental breakdown of Mehemet, he died at Cairo, Nov. 10. See Egypt; Mehemet Ali; Syria; Turkey.

Ibrox. Suburb of Glasgow. In the W. of the city proper, it is mainly a residential area, lying along and around the Paisley Road. Public transport connects it with the centre of the city. Here are the football ground of the Rangers and Bellahouston Park.

Ibsen, **HENRIK JOHAN** (1828–1906). Norwegian dramatist and poet. He was born March 20, 1828, at Skien in S. Norway, his father being a merchant, who met with business reverses. Henrik's boyhood therefore was spent in



severe poverty, and he became an apprentice in a chemist's shop at Grimstad in 1843. In 1849 he began to publish sentimental poems and caustic epigrams. In 1850 he went to Christiania (Oslo) with a view to entering the university, but politics and the theatre meant more to him than his studies, and in the same year his first play, *Catilina*, was printed. In 1851, having meanwhile earned his living chiefly by journalism, he was made director of the chief theatre at Bergen, for which he wrote *S. John's Night*, 1853, *Olaf Liljekrans*, 1857, and other plays.

In 1857 Ibsen became director of the new national theatre in Christiania. Here he produced his first really successful play, *The Warriors in Helgeland*, 1858, written in the spirit of the old Sagas. His *Love's Comedy*, the first work in which his gift of bitter satire was conspicuous, made him unpopular and hastened the threatening bankruptcy of the theatre. The university now granted him a small allowance for researches into the folklore of the peasantry. In 1864 the Norwegian government allotted him a travelling scholarship which enabled him to visit Rome, and in 1866 he was granted a poet's pension of about £120 a year. He spent the following eight years chiefly in Dresden. He



1. Herds of reindeer and mammoths of the Somme district, Northern France. 2. Mastodon, Royal Bison, and American horse in the Missouri valley. 3. Woolly rhinoceros and distant herd of mammoths in the Steppe climate, Northern France. 4. Deer moose, tapir, and giant beaver in Northern New Jersey

ICE AGE : RECONSTRUCTION OF THE FORMIDABLE ANIMAL LIFE THAT ROAMED THE EARTH AT THE CLOSE OF THE GLACIAL EPOCH

From paintings by O. R. Knight, by courtesy of The American Museum of Natural History

continued to live out of Norway, wintering as a rule in Munich, until 1891, when he returned to Christiania. Here he remained until his death, May 28, 1906.

Ibsen's dramatic poems, *Brand*, 1866, which embodied an attack on the pettiness and narrowness of Norwegian officialdom, and *Peer Gynt*, 1867, had established his position as a writer of genius. Of his most famous plays, *Emperor and Galilean* came first in 1873; then *Pillars of Society*, 1877; *A Doll's House*, 1879; *Ghosts*, 1881; *An Enemy of the People*, 1882; *The Wild Duck*, 1884; *Rosmersholm*, 1886; *The Lady from the Sea*, 1888; *Hedda Gabler*, 1890; *The Master Builder*, 1892; *Little Eyolf*, 1894; *John Gabriel Borkman*, 1896; *When We Dead Awaken*, 1900.

The technical revolution effected by these plays was complete. Ibsen got rid of the old rules of exits and entrances, the self-revealing soliloquies and explaining servants, and put on the stage people who told their own story. Often half the plot has taken place before the curtain rises; the drama consists in the subsequent working out. At the time the matter of his plays aroused opposition. He attacked accepted institutions, the family, property, and religion; he asked whether a convention, because it exists, need be right. To ensure that Ibsen's genius should be recognized it needed the disinterested championship of Björnson in his own country, and in England the persistence of Archer, Bernard Shaw, and Gosse. If many of the actual questions posed by Ibsen have now been satisfactorily answered, that does not put his plays out of date, for his characters have a vigorous humanity. They also express his own almost mystical conviction that the only evils are denial of love and suppression of truth.

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Ibycus. Greek lyric poet. He was born at Rhegium in Magna Graecia, Italy, and flourished in the second half of the 6th century B.C. He led a wandering life, and for some time resided, together with Anacreon, at the court of Polycrates, tyrant of Samos. According to a well-known story, he was murdered by robbers on his

way to the Isthmian games, the crime being afterwards detected through some cranes which had flown over the spot and followed the murderers to the market place at Corinth in answer to his dying request. Hence the expression "the cranes of Ibycus" became proverbial for detection of crime by supernatural agency. Of Ibycus's poems, composed for choruses of boys, only fragments survive.

Ica. A maritime department of Peru. It is bounded on the N. by Lima and S. by Arequipa. Its area is 9,796 sq. m. Mountainous in the E., and traversed by low hills in the W., the soil is unproductive except in the valleys, where sugar, vines, tobacco, cotton, rice, and indigo are cultivated. The minerals include gold, copper, and iron ore. Pop. 140,898.

Ica, the capital, founded in 1563, stands on the Putamayo river, 46 m. by rly. S.E. of Pisco, on the coast. Through it runs the Pan-American Highway. Cotton, sheep, and grapes are raised, and there are textile mills and an oil industry. Pop. 21,280.

Icarians. Name given to the members of a communistic settlement founded in Texas in 1848 by Étienne Cabet (*q.v.*).

Icarus. In Greek mythology, the son of Daedalus. While accompanying his father in his flight from Crete, he was drowned near Samos in the sea called after him Icarian. See Daedalus.

Ice. Water in the solid state. Water in the pure state freezes at 0° C. or 32° F., at ordinary atmospheric pressure, into a crystalline solid. The crystals are difficult to see in an ordinary block of clear ice, but appear well defined in snow and hoar frost. Whenever water is cooled below about 4° C., expansion occurs. Water thus has the peculiar property of a maximum density at 4° C. Also ice is less dense than water at 0° C. When lakes and ponds are cooled during frosty weather the densest liquid sinks to the bottom until the whole mass is at the same temperature; further cooling causes freezing first at the surface, the ice floating on top. If water followed the usual course of contracting continuously, with fall of temperature the ice would extend from the bottom upwards.

In some rivers on the Continent freezing is a more complicated process, ice forming on the beds and at the sides as well. The freezing of water brings forces into play, through the change in volume, which will burst water pipes.

Impurities mixed with water have the effect of lowering the freezing point, sea-water freezing between -2.5° and -3.0° C.

The absorption of heat during the melting of large blocks of ice, *e.g.* icebergs, is of climatic importance; the great ice masses of the Arctic influence the climate of N.W. Europe.

Accumulations of ice on the wings, propeller tips, etc., of aircraft in flight tend to alter the aerodynamic characteristics and present a serious problem to the airman. Ice can be produced by the impinging of supercooled water drops present in clouds on the leading edges of the wings. Heavy coatings of clear ice can result from passage through rain when air temperature is below freezing point (glazed frost). Icing can occur in any type of cloud except those composed of ice crystals (cirrus).

Ice accretion is most likely to occur when the air temperature is anything up to 20° F. (11° C.) below the freezing point. In the British Isles in winter the freezing level falls from an average summer value of 10,000 ft. to about 2,000 ft.

The practice of harvesting ice from lakes, etc., in winter and storing it in bulk for use in cooling and preserving foodstuffs in summer was started by the Romans, and greatly extended during the 19th century in the U.S.A. During the 20th century it has been superseded by the manufacture of ice both on a commercial scale and piece-meal in domestic refrigerators. See Ice-making; Refrigeration.

Ice Action. Term used for the wearing away or alteration of the shape of land, rocks, etc., by the action of ice. The expansion of water freezing in cracks in rocks, for example, tends to increase the cracks; floating masses of ice in rivers wear away the banks; glaciers alter the configuration of mountain ranges, grinding down rocks, carrying away huge boulders, etc. All these are forms of ice action, and have had great effect in altering the surface of the earth.

Ice Age. The earlier part of the existing geological period, the Pleistocene. It is called the Great Ice Age because various countries were then overwhelmed by ice-caps like that of Greenland, while the glaciers on the equatorial mountains, *e.g.* Ruwenzori and in the Andes, were more extensive, and those in the subtropical regions like the Eastern Himalayas descended as low as to 3,600 ft., *i.e.* 10,000 ft. below their present limit. Ice covered large areas of



Ice Age. Map of Europe showing the extent of the ice during the period of maximum glaciation. Glacial deposits extended farther south

N.W. Europe, Canada, and the northern U.S.A., and, as it melted, the included earth and stones were spread out in vast sheets of irregular deposits, which were known as the "diluvial drifts," until Agassiz recognized them as laid down by ice.

Glacial deposits cover most of the British Isles N. of a line from the Thames to the lower Severn. Ice from Scandinavia spread S. into Germany, while the glaciers of the Alps and Pyrennees were more extensive than at present. Small glaciers existed as far S. in Europe as the Balkans. In the S. hemisphere large glaciers occurred in Tasmania and New Zealand.

The depositing of sediment by the melt-water set free by withdrawing ice sheets in Europe enables estimates to be made of the climatic variations during the period of deposition. With the summer flows only the coarser sediments would be deposited, while with the slower autumn flows the finer ones would be deposited. Thus banded sediments known as varved clays were formed, the thickness of the bands or varves corresponding to the flow of water at different times of the year, and their number affording a means of dating depositions.

That the British glacial drifts were formed under cold conditions was proved by the fossils found with them. Arctic shells occur in the marine beds; the reindeer, the Siberian or Saiga antelope, and the musk-ox lived in the Thames valley; and some of the extinct animals, e.g. the mammoth, were clad in long fur.

The widespread glaciation was at first attributed to astronomical causes. A general fall of temperature due to a diminution in the heat received from the sun would, however, reduce evaporation from the sea, and therefore lessen the snowfall and decrease the size of glaciers. The cause was more probably geographical, differences in the arrangement of land and water leading to changes in the winds and a different distribution of rainfall and snowfall. The snowfall was concentrated successively at different areas, which then became great glacial centres. The ice-sheets several times increased and waned, the glaciations being separated by warmer periods.

Man was contemporary with at least the later glaciations, his remains being found in England and France with the mammoth and reindeer in beds earlier than the last glacial deposits. Ice ages early in the earth's history have been proved in the Cambrian in Central China and the subtropical districts of S. Australia; also in the Carboniferous in S. Africa, S. America, Australia, and Central India. See Fossils; Mammoth; Man.

J. W. Gregory

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Age, R. S. Ball, 1891; The Great Ice Age and its Relation to the Antiquities of Man, J. Geikie, 3rd ed. 1894; Quaternary Ice Age, W. B. Wright, 1914; Dating the Past, F. E. Zenner, 1946.

Ice Axe. Implement comprising both axe and pick for cutting steps in ice or hard snow. Its length should not exceed 45 ins. Principally used in ascending ice slopes, it is part of a mountaineer's equipment. See Mountaineering.

Ice Barrier. Line of cliffs of ice forming the oceanward coast-line of the Antarctic ice shelves. The largest is in the Ross Sea, discovered in 1842; rising sheer to over 200 ft., it stretches more than 400 m. from Marie Byrd Land to South Victoria Land. The Bay of Whales, used as his landing place by Admiral Byrd in his South Polar expeditions, is in the Ross Barrier.

The position of the ice-barriers is not constant. When Borchgrevink sailed to the Antarctic in 1898 he found the Ross Barrier much farther S. than it had been reported in 1842. Recent expeditions state that it is now moving N. at about a quarter of a mile yearly. Erosion by sea and internal pressure in the ice give rise to continual "calving" by the barriers, i.e. to the formation of icebergs which break off from the main cliff face. Ice barriers do not occur at the North Pole, owing to the different configuration of the land. See Antarctic Exploration; Ice Shelf; Ross Sea.

Iceberg. Mass of land ice which has broken away from a glacier or ice sheet. When a glacier or ice sheet reaches the sea, the ice is buoyed up by the water, or cut by wave motion, so causing masses to break off. About one-ninth of an iceberg is above the water, and Arctic bergs have been seen 300 ft. high, i.e. 2,400 ft. below water. Greenland ice sheets and glaciers form most of the Atlantic icebergs, rarely seen below 40° N.

Glacier icebergs are irregular in shape, broken up by crevasses, and greenish in colour. Those which have broken away from the great ice barrier and are characteristic of the Antarctic are somewhat rect-



Iceberg, showing, on the left, rough face caused by recent fracture

angular and whiter in appearance. Their thickness may be several hundred feet, their length above ten miles. Icebergs constitute a grave danger to shipping. See Antarctica; Polar Regions.

Icebreaker. Ship specially designed to break its way through ice-bound waters. The bow, reinforced to enable the ship to shatter blocks of ice, is somewhat spoon-shaped so that it tends to climb the ice and break it downwards by weight. Some icebreakers simply clear a passage for other vessels, but frequently they combine that function with that of tugs or train ferries (e.g. on the Great Lakes in N. America).

Russian icebreakers have done outstanding work in North Polar exploration: the Krasine rescued the crew of the Italian airship Italia which crashed in the Arctic in 1928; the Georgi Sedov cruised from Archangel to Franz Josef Land by way of Novaya Zemlya and Northland in 1930; the Malygin had a dramatic meeting with the Graf Zeppelin off Hooker Island in 1931; and in 1938 the Taimyr and the Murman relieved an expedition under Papanin which had been camped on an ice-floe near the North Pole for nearly a year.

Ice Cap. An area of ice which covers the whole South Polar region within approximately the 75th parallel of latitude. On land it has formed innumerable glaciers, some flowing in ice-worn valleys, others making a continuous ice-front running into the sea. Above the sea the ice cap takes the form of shelf ice, floating islands of ice anchored to the mainland by the glaciers which feed them. The depth of the ice cap has never been sounded, but it is estimated to vary between 500 and 1,500 ft. in the ice shelves and rise exceptionally to 2,000 ft. on land. Of the 5,000,000 sq. m. which make up the Antarctic continent, less than 100 sq. m. is not permanently covered with ice. Similar conditions to those of the Antarctic ice cap are encountered occasionally in the North Polar region, but there is no widespread ice cap and shelf ice is unknown. See Antarctica.

Ice Cream. General term to describe a variety of frozen compounds, prepared from ingredients which may include water and sugar, with fruit juice or other flavouring, and in the richer forms, cream and eggs. The simplest form is the water-ice or sorbet, made from a syrup obtained by boiling sugar in water, to which fruit flavouring and sometimes white of egg are added, the mixture being frozen through. But this is not usually classed as an ice cream. The word cream indeed has become



Icebreaker at work to keep the riverway clear on the Northern Dvina

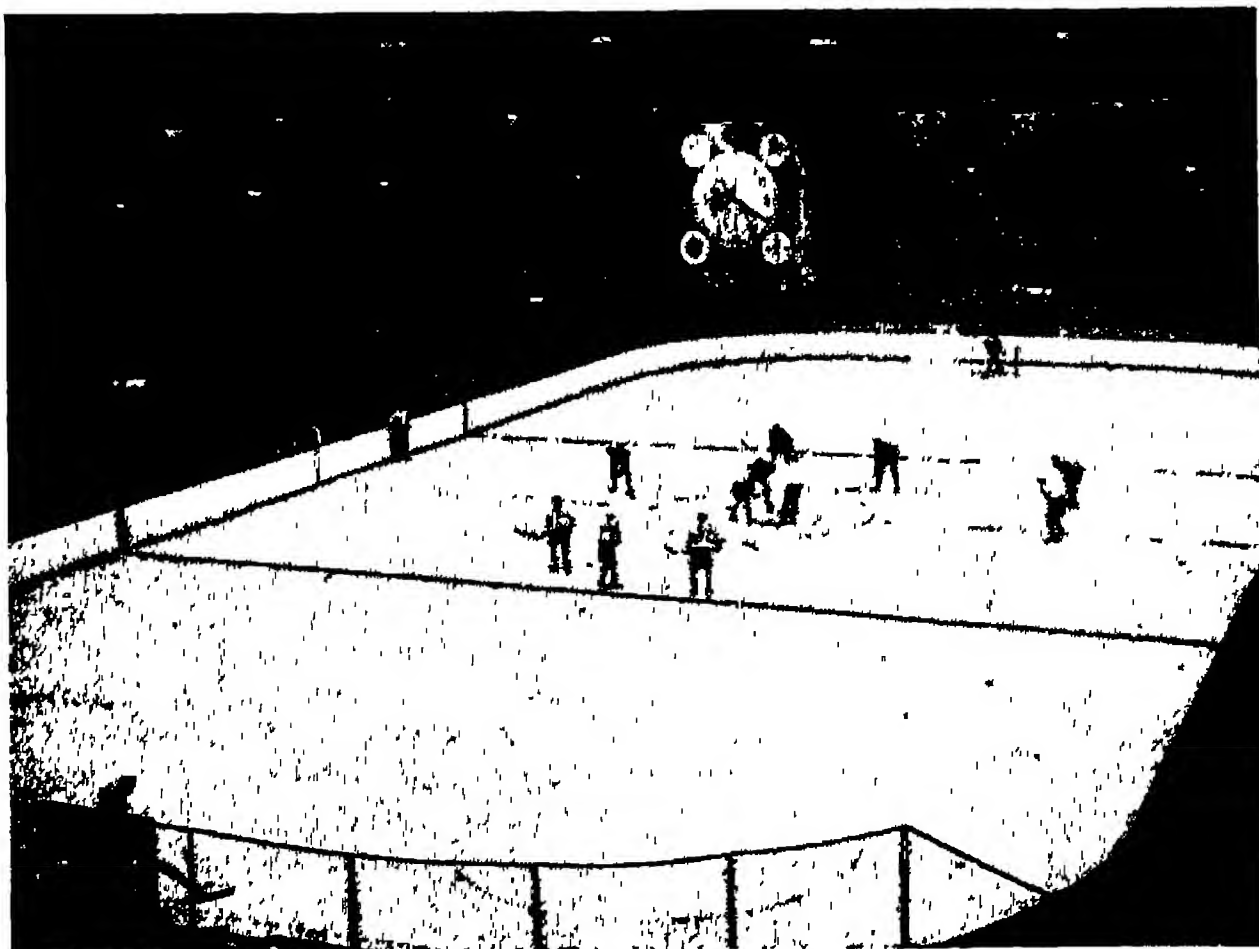
something of a misnomer when applied to most commercial ice cream products of the U.K. These are made on a large scale. The mixture, originally of milk, cream, and sugar, is now more commonly prepared from starch in some form or fats. This is poured into tanks, cooled, and allowed to stand for 24 hours. It is then transferred to containers or moulded into bricks and wrapped in paper. These are transferred to the freezing room (10–20° F. below zero), and thence they are sent direct to the retailers.

In 1947 the ministry of Health introduced regulations by which all ice cream sold to the public must be sterilised by heat treatment, a practice long standard in the U.S.A. The mixture is heated to 150° F. for 30 mins. or to 160° for 10 mins. and then cooled to not more than 45° for an hour and a half before being frozen. The ice cream must be stored at a temperature of not more than 28° until sold. Thermometers must be used during manufacture.

Confectioners and chefs have devised attractive dishes from ice cream in combination with fruit, fruit juices, hot sauces, etc. These include various sundaes and parfaits, with such names as Coupe Jacques, and Knickerbocker Glory. Most of these originated in the U.S.A., where consumption of ice cream per head is much greater than in any other country in the world.

Ice Hockey. Game similar to hockey (*q.v.*), played upon ice. It is Canada's national winter game, and is said to be the fastest game in the world. The actual origin of ice hockey is unknown, but it was certainly played in the Fen district as far back as 1813, introduced into Canada in the garrison cities of Halifax and Kingston 40 years later, and re-introduced into the U.K. at the beginning of the 20th century by Canadian students who played at the old Princes skating club. Not only in the U.K., but also on the Continent, the game was formerly known as bandy. In Sweden bandy continues to be popular.

Ice hockey is played by two teams of six; substitutes may



Ice Hockey. The rink at Harringay, London; the scoring clock, suspended over the centre, is the only one of its kind in Europe



Ice Hockey. Game in progress during the world ice hockey championship held at Prague, Feb., 1947

replace the players during the match. Owing to the great speed at which the game is played and the risk of injury, players may wear protective equipment. Skates of any approved design may be worn. The sticks are of wood or other approved material, and must have no projections. From the heel, they must not exceed 53 ins. to the end of the shaft, 14½ ins. to the end of the blade. The blade must not exceed 3 ins. in height, except for the goalkeeper's stick, which must not exceed 3½ ins. except at the heel where it must not exceed 4½ ins. The puck, a flat round disk made of vulcanised rubber or other approved material, 1 in. thick and 3 ins. in diam., is used in place of a ball. Its weight must not be less than 5 oz. or more than 6 oz.

The game is divided into three periods of 20 minutes' play, with 10 mins. rest between periods.

The rink should be about 200 ft. by 80 ft. and should be surrounded by a wooden wall or fence—the boards—not more than 4 ft. and not less than 3 ft. 4 ins. in height from the surface of the ice, free of any obstruction or object that may injure the players.

Playing positions are: goalkeeper, left and right defence, right wing, centre, left wing. Play is started by a face-off. The two players taking the face-off must stand squarely each facing his opponents' goal and with the full blade of his stick on the ice. No other player is permitted within 10 ft. of the face-off. The referee drops the puck between the sticks of the facing-off players, which must remain on the ice until the puck touches it.

Primarily the stick must be used for playing the puck, but kicking is permitted. A kicked goal, however, is disallowed. The puck may be stopped by the hand, but it must not be clutched or held except by the goalkeeper,

who must not hold it longer than 3 secs.

A player is sent off the ice without replacement for 2 mins. as a minor, 5 mins. as a major penalty. For certain misconduct offences the offending player is sent off the ice, but may be replaced; or he may be sent off the ice

for the rest of the game.

The first ice hockey league in the U.K. was formed during the season 1897-98 when five teams played against one another, the Niagara (eventual winners), Princes, Henglers, Cambridge, and London Canadians. This league organized a competition each season, except in 1912, until the First Great War, Princes winning it five times and Oxford Canadians four. The British ice hockey association, the controlling body for Great Britain, was not created until the 1913-14 season.

In 1908 an international federation, with Great Britain, France, Belgium, Switzerland, and Bohemia as founder members, was formed. When the Second Great War started in 1939, its membership had increased to 20, and, at the international congress, held at Prague in February, 1947, 19 countries were represented, Germany and Japan being excluded. The international federation arranged world and European championships.

With the outbreak of the First Great War ice hockey ceased, and very little was played in Great Britain for years afterwards. A British club, however, won the

international tournament at St. Moritz in 1922 and 1923. Ice hockey was first included in the Olympic games in 1920 at Antwerp; Canada won, and the U.S.A. was second. A team from Great Britain entered in the Olympic games at Chamonix in 1924, finishing third after Canada and the U.S.A. In 1936 Great Britain won not only the Olympic title but also the world and European championships—the first team ever to win the three titles in one year. But though every member of that team had been born in Great Britain, most of them had gone as children to Canada and learned to play ice hockey there. Great Britain won the European title also in 1910, and again in 1937 and 1938.

In 1927 an ice club was opened in Grosvenor Road, London; the building of other rinks followed, and the game increased steadily in popularity until in 1939-40 Canadian army teams participated in a specially organized league, playing more than 60 games.

After a break enforced by the Second Great War, league and competition play was resumed for the 1946-47 season with seven clubs participating in the national league—Racers and Greyhounds at Harringay; Panthers at Nottingham; Lions and Monarchs at Wembley; Tigers at Brighton, and a club at the Streatham rink.

John F. Ahearne, Sec.,
British Ice Hockey Assoc.

Icel. Vilayet of Asiatic Turkey. Bordering the Mediterranean and facing Cyprus, it has Adana (Seyhan) to the E. and Konieh to the N. From the slopes of the Cilician Taurus several streams run S.E. to the coast. Tarsus and the port of Messina are in the vilayet. Pop. 280,102.

ICELAND: ITS HISTORY & LITERATURE

A. C. Crawley, Lecturer, University of Leeds

The story of an independent republic in the far north, little larger than Ireland and 500 m. from the nearest point of Europe, which has nevertheless developed a sturdy European culture of its own.

See also Reykjavik; Sigurdsson, John

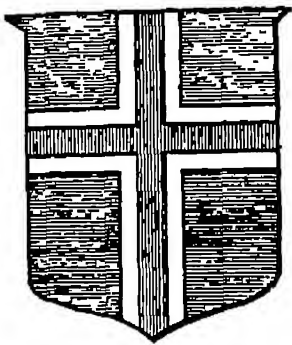
The republic of Iceland is an island lying between lat. 63° 23' N. and the Arctic circle, 156 m. E. of Greenland and 500 m. from the north coast of the British Isles. The journey of 900 m. from Leith, the port of Edinburgh, to Reykjavik, the capital of Iceland, takes about two-and-a-half days by sea; the crossing by air from Reykjavik to Prestwick in Scotland takes only five hours. Iceland, in fact, has, since the coming of air

travel, lost its age-old isolation.

Because of its northern situation Iceland has scarcely more than two hrs. of light on the shortest day in winter, and about the same number of hrs. of darkness on the longest day in summer. Icelandic mean time is one hour behind Greenwich mean time, and four hours ahead of New York time.

Iceland has an area of c. 40,000 sq. m., its greatest length is 300 m., its greatest breadth 200 m.

PHYSICAL FEATURES. Of its whole area barely a quarter is habitable; this is made up of the lowlands in the S. and S.W. and of the valleys running up from the numerous bays and firths that indent the coast, except in the S. The fjords in the S. have been



Iceland arms

filled up during the ages by glacial rock waste, so that the S. coast is now harbourless. Fortunately for fishermen, however, the Vestmanna Islands, which have a good harbour, lie only about 12 hrs. by trawler from Reykjavik.

The interior of the country is a mountain plateau from 2,400 to 2,700 ft. above sea-level, strewn with enormous glaciers, lava fields, volcanoes, hot springs, rivers, lakes, waterfalls, and other remains of volcanic eruptions and signs of ancient glacial activity. It stretches from Vatnajökull in the E. (*jökull* means glacier) by way of Hofsjökull and Langjökull to Faxa Bay on the W., where it ends in impressive mountain ranges on each side of the bay. At the end of the northern range stands Askja Snæfell, while in the southern range towers Esja, dominating the harbour of Reykjavik.

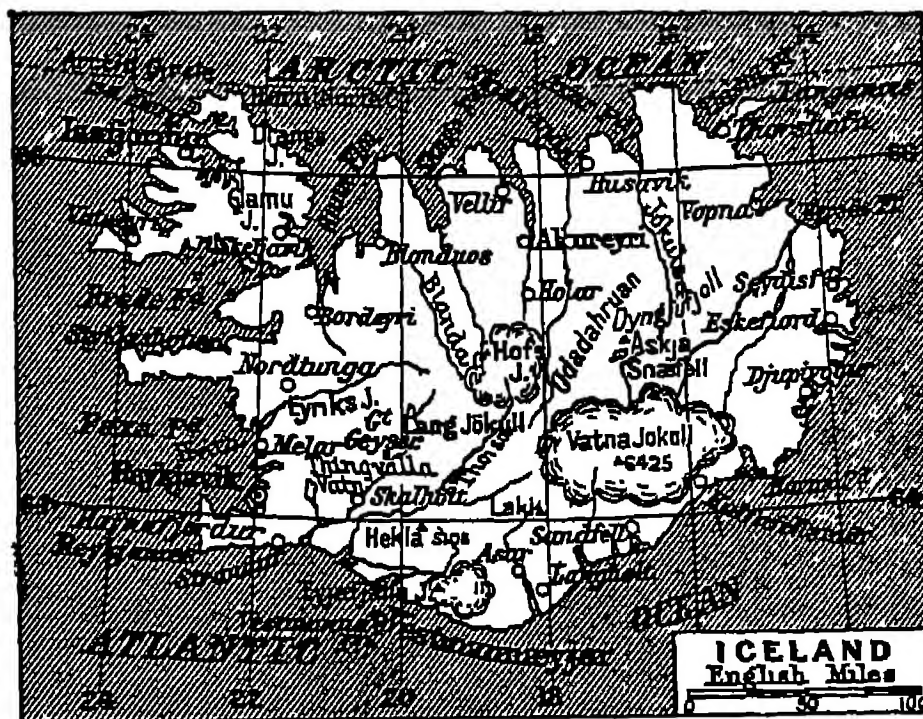
This mountainous waste is cut through by innumerable rivers, large and small, useless for navigation, but teeming with salmon and trout and invaluable as sources of electric power. Thus the electricity for Reykjavik and its environs is supplied from Ljósafoss, a power-station on the Sog river just S. of Thingvallavatn. Thingvallavatn in the S.W., with an area of 25 sq. m., and Myvatn in the N. are the best known and perhaps the most beautiful lakes in Iceland, but there are many others. Of the numerous waterfalls mention must be made of Gullfoss (to the E. of Thingvallavatn), Godafoss on the R. Skjalafandafjot in the N., Dettifoss in the N.W. on the Jökulsá, and Hengifoss in the E., the highest (approx. 380 ft.).

The highest mt. in Iceland, the volcano Oraefajökull (6,624 ft.), is part of the glacier Vatnajökull. Mt. Hekla, 4,747 ft., the famous "burning mountain" (according to legend, one of the main-gates to hell) is in the S.; its very serious eruption of 1947 was the 22nd since the volcano was discovered. An exceptionally disastrous erup-

tion, even in Iceland's long volcanic history, was that of Laki (to the S.W. of Vatnajökull) in 1783, when a lava stream some 45m. long and 15 m. broad spread over the countryside.

Hot springs are found everywhere, both the eruptive kind, like the Great Geyser in Haukadal which has given its name to all other eruptive hot springs in the world, and the non-eruptive wells, some of which are low enough in temperature to make fine natural swimming baths. Many of the hot springs are used to heat houses (Reykjavik is now heated in this way) and greenhouses in which flowers, fruits, and vegetables are cultivated.

CLIMATE. In spite of its forbidding name, Iceland has a remarkably mild climate for a country so far north, due in large measure to the moderating influence of the Gulf Stream. The average Jan. temperature in Reykjavik (S.W.) is 30° F. and in Akureyri (N.) 27° F.; the average July temperatures are



Iceland. Map of the North Atlantic island, which is now an independent republican state

51.7° F. and 51.5° F. respectively. The yearly rainfall is much heavier in the S. (about 50 ins.) than in the N. (from 12 to 17 ins.), which is protected by the central mt. mass from the moisture-laden southerly winds of the autumn and winter. On the other hand, the N. has more snow than the S. Iceland has long periods of gales and grey, stormy weather, especially in winter, but on fine summer days the atmosphere is crystal clear and the light effects are then extremely beautiful.

VEGETATION. Because of its comparatively mild climate, Iceland has a profusion of wild flowers in spring and summer and rich grass for pasturing sheep and horses. There are, however, few trees of any size.

ANIMAL LIFE. There is much bird life, but no wild animals except the mountain fox and the reindeer, which were introduced into Iceland in the 18th century.

ORIGIN OF THE ICELANDERS. The Icelanders are descended from Norwegian settlers, the chiefs and their followers, who left Norway rather than become subject to King Harold Fairhair. The Norwegian viking Floki, to whom Iceland owes its name, spent one summer and winter there in A.D. 865-6; but the first permanent settlement was made in the year 874 by another Norwegian, Ingolf Arnason, who claimed land for himself where Reykjavik now stands. According to Ari the Wise, the author of *Islendingabok* (The Book of the Icelanders), "in sixty winters Iceland was all settled, and no settlement was made after that time." Many of the Vikings came from the British Isles, where they had previously settled, and brought Irish and Scottish wives, followers, and slaves with them.

Some Icelandic scientists believe the Celtic admixture to be as much as 30 p.c. The Icelanders are, on the whole, darker in hair and complexion than the other Scandinavian peoples.

An Icelander, Eric the Red, discovered Greenland (*q.v.*) in 981, and gave it a deceptively pleasant name which attracted

settlers to it. These settlements survived until the 15th century.

POPULATION AND CHIEF TOWNS. The pop. of Iceland when the first census was taken in 1703 was c. 50,000. By 1901 it had risen to 78,000, and in 1950 was 144,263. About the turn of the century a large number emigrated to Canada and the U.S.A.

The capital of Iceland is Reykjavik with a pop. (1950) of 55,980; the second largest town is Akureyri (pop. 7,439). Other towns include Hafnarfjörður (5,055), near Reykjavik; Isafjörður (2,827), centre of the herring industry, in the N.W.; and Siglufjörður (3,060) in the N.

RELIGION AND EDUCATION. The R.C. faith was adopted by law in the year 1000 at a meeting of the

althing, where it was also decided that the old heathen rites might still be practised, on condition that no witnesses were present. This wise and tolerant compromise continued until 1550, when the Reformed religion was introduced by royal command against the will of the people, resulting in a period of fanaticism and oppression. Today the ancient feuds are forgotten, and the national Evangelical Lutheran church exists peacefully with the R.C. and Free churches.

Education is state controlled, and ranges from nursery schools to the University of Iceland (Haskoli Islands), founded 1911, which has some 700 students, many of whom go abroad at their own or the government's expense in order to continue their studies. The faculty of medicine, which is especially strong, is the basis of an excellent state medical service and a reminder that the famous light therapist, Niels Finzen (1860-1904), was a scientist of Icelandic birth.

NATURAL RESOURCES. The only minerals of value are calcareous spar and sulphur; iron, steel, timber and cement all have to be imported. Iceland also imports grain, salt, woollen and cotton goods, and most of its luxuries. To pay for these imports, the Icelanders depend on fishing and (to a less extent than formerly) the rearing of sheep, ponies and cattle. Some of the richest fishing grounds in the N. Atlantic lie off the coasts, and fish and fish-products are the basis of the country's economy. Iceland does most of its trade with Great Britain, Denmark, and the U.S.A., also, in normal times, with the Mediterranean countries. Various industries, especially in connexion with

fishing, made possible by the exploitation of water power, were stimulated by the difficulties in international trade during the Second Great War.

Until the introduction of motor vehicles just before the First Great War, all transport on land was by pack-horse; there were no roads fit for heavier traffic. Until 1906 there was only one telephone line, seven miles long. Farmhouses were of sod on a timber frame; most town houses were of wood. Forty years later, though there was no rly., Iceland had taxicabs, buses, and aeroplanes for inland transport, steamers for coastal traffic, passenger boats and air liners for foreign travel, concrete houses and public buildings, a radio station, cinemas, cheap electricity, and central heating from the hot springs.

CONSTITUTION. The first settlers founded in 930 a general assembly (*althing*) with legislative and judicial powers over the whole country. This met each summer to make laws and judge lawsuits. It had no executive authority, however, for this remained in the hands of the principal families that had settled the land.

The essential unit of Icelandic society at this period was the family, and the stability of this society depended on respect for blood ties and loyalty to the *godi*



Iceland. 1. Girl of Reykjavik in bridal head-dress. 2. Women washing clothes and making coffee at hot springs. 3. Group of haymakers

The republic came to an end, and the authority of the *godi* was abolished. In 1380 Norway was united with Denmark through marriage, and, with Iceland, came under the Danish crown.

During the next four centuries plagues, famines, volcanic eruptions, and the stranglehold of the Danish trade monopoly (established in 1602 and not abolished until 1854) inflicted severe sufferings on the Icelanders. The scholar Jon Sigurdsson (1811-79) was the leader through whose efforts Denmark granted Iceland its own legislature in 1871, home rule in 1903. The Act of Union, 1918, made Iceland a free and sovereign state united with Denmark only through the fact that the king of Denmark was also king of Iceland, Denmark retaining, however, control of foreign relations. This Act lapsed on Jan 1, 1944, and a referendum in May at which 98 p.c. of the electorate voted gave 70,725, against 370, in favour of separation from Denmark; 69,048 in favour of a republic, which was proclaimed on June 17 (the birthday of Jon Sigurdsson).

The althing (parliament) of 52 members, two-thirds forming the lower house, the other third (elected by the whole althing) the upper, is elected on a system of proportional representation by all men and women over 21.

THE SECOND GREAT WAR. In view of submarine and air warfare the position of Iceland in the N. Atlantic was of prime strategic importance. Her inhabitants, whose only armed forces were 70 policemen, could not have defended the island effectively. The number of Germans there increased considerably after the outbreak of war in 1939, and a strong local Nazi party had been organized by the German consul.

Germany invaded Denmark on April 9, 1940. The althing thereupon assumed the royal prerogative, establishing direct diplomatic relations with the U.K. and the U.S.A. On May 10, a small force of British troops landed in Iceland, where they installed coastal defence guns and laid out airfields, from which the Royal and Royal Canadian Air Forces flew patrols in Catalina flying-boats. U.S. naval and military forces partially relieved the British on July 7, 1941, Iceland then becoming a vital link in the defence of the shipping carrying lease-lend goods to Great Britain. By Nov. 1942, all British military forces had been withdrawn, though the

or local chief. It disintegrated in the 13th century, when the principal families became engaged in bloody and unending feuds. King Haakon Haakonsson of Norway, taking advantage of the chaos, persuaded the Icelanders to swear allegiance to him in 1262.

navy and R.A.F. remained. The presence of foreign troops was disagreeable to the Icelanders, but there was no active opposition; the Allied forces, who did not interfere in the internal affairs of the country, were withdrawn following the end of hostilities.

Bibliography. The Icelandic Year-Book; Letters from High Latitudes, Lord Dufferin, 1858; History of Iceland, K. Gjerset, 1924; Letters from Iceland, W. H. Auden and L. Macneice, 1937; Iceland, Past and Present, B. Thordarson, 1945; History of Education in Iceland, G. T. Trial, 1945; Icelandic Church Saga, J. C. F. Wood, 1946.

LANGUAGE, LITERATURE, ART. Icelandic is a N. Germanic language closely related to Norwegian, Danish, and Swedish, so that an Icelander has little difficulty in picking up these Scandinavian languages. It is a highly inflected tongue, much more so even than German, and it has few foreign words because the genius of the language prefers to form new compound words rather than to borrow from abroad. Although it has undergone some changes in pronunciation during the past thousand years, it is still substantially the same language that was spoken by the first settlers in Iceland. There are few differences between the spoken and the written forms.

Iceland is, above all, remarkable for its literature. Icelandic first became a literary, as distinct from a spoken, language at the beginning of the 12th century, as a result chiefly of the decision of the althing in 1117 to commit all the national laws to writing during the following summer. The learned Ari Thorgilsson (1067-1148) wrote the *Islendingabok* (The Book of the Icelanders), and probably had a share in writing the *Landnamabok* (The Book of the Settlements), both of which are invaluable sources for the early history of Iceland. Snorri Sturlason (1178-1241), the greatest historian of the north, wrote *Heimskringla*, a history of the kings of Norway down to his own day, and the *Younger Edda*, consisting of a survey of Norse mythology and a discussion of skaldic diction and metres, with examples by Snorri himself. Snorri quoted copiously from the *Voluspá* (The Sibyl's Prophecy), *Grimnismál*, and other poems of the *Elder Edda*, a collection of the oldest Norse poetry which dates from the end of the 12th century but contains heathen

poems that must be as old as the 9th. Snorri may also have been the author of *Egils Saga*, one of the finest of the Icelandic family sagas, in which occur two brilliant poems in the elaborate style of the skalds or court poets—*Hofudlausn* (Head-ransom), and *Sonatorrek* (Loss of My Son), which is among the great elegiac poems of the world.

Egils Saga, *Brennu-Njals Saga*, *Grettis Saga*, *Laxdaela Saga*, and *Eyrbyggja Saga*, all dating in their written form from the 13th century but going back much earlier in oral tradition, are the greatest of the histories of the leading Icelandic families. They are masterpieces of story-telling, and are unforgettable for their characterisation and embodiment of the heroic view of life.

In modern poetry, H. Petursson (1614-74), M. Jochumsson (1835-1920), E. Benediktsson (1864-1940), and D. Stefansson (b. 1895) are worthy of mention. Jochumsson is also well known as the translator of several of Shakespeare's tragedies into Icelandic verse. In prose, the leading contemporary novelists are G. Gunnarsson (b. 1889), H. K. Laxness (b. 1902), and K. Gudmundsson (b. 1902); they have all been translated into English and other European languages. More books are published in proportion to the size of the pop. than in any other country of the world.

Sculptures by Einar Jonsson (1874-1954) are housed in a splendid museum in Reykjavik. The best of the Icelandic painters—Kjarval (b. 1885), A. Jonsson (b. 1876), and J. Stefansson would be outstanding in any country.

Bibliography. Modern Icelandic Plays, J. Sigurjonsson, 1916; An Introduction to Old Norse, E. V. Gordon, 1927; *Edda and Saga*, B. Philpotts, 1931; *Ships in the Sky*, G. Gunnarsson, 1938; Icelandic Grammar, texts, glossary, S. Einarsson, 1945; *Origins of Icelandic Literature*, G. Turville Petre, 1953. Translations of *Brennu-Njals Saga*, *Grettis Saga*, and the *Heimskringla* are included in the *Everyman's Library*.

Iceland Moss (*Cetraria islandica*). Native lichen of the mountainous regions of Europe, Asia, and N. America. Growing erect upon the ground, it is a thick, branching ribbon of brown colour, the ultimate divisions with fringed margins, and the base stained with crimson. In Arctic regions it is used as food, by boiling into jelly, converting into soup, or drying, and powdering it for use as a sub-



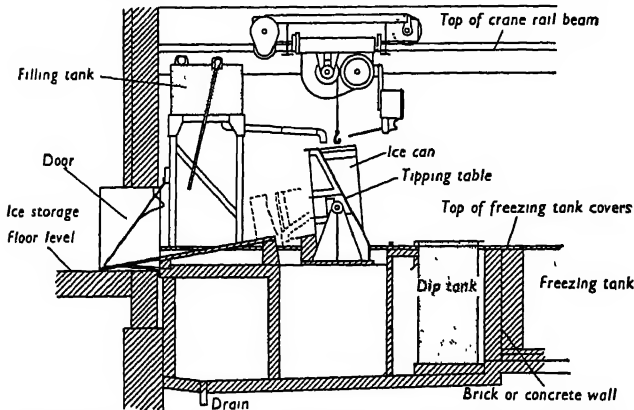
Iceland Moss, a lichen used for food in Arctic regions

stitute for flour. It is also of value as a dye stuff.

Iceland Spar. Very clear, transparent form of calcite (calcium carbonate) originally found in Iceland. The crystals are colourless and hexagonal with almost perfect cleavage, and since the speed of light through them is different in different directions, they exhibit the property of double refraction whereby a beam of ordinary light passing through them is split into two beams of plane-polarised light with the planes of polarization at right angles to each other (see *Polarisation of Light*). Iceland spar is used in making nicol prisms, until the invention of polarised screens the normal means of producing plane-polarised light and of determining the plane of polarisation—hence extensively used in polarimeters (*q.v.*).

Ice-making. Ice owes its usefulness to its convenience in handling and to its great absorption of heat when thawing. Until the advent of automatic refrigeration, ice was the accepted means of food preservation in the home. It still has applications where the cooling hours per year are insufficient to render mechanical refrigeration economical, such as for short shipments of food and for comfort in mild climates. Greeks and Romans used natural ice to chill their wines and dainty foods and on occasions even produced it by radiant cooling, a method still practised in India. Shallow pans containing water are exposed to the clear night sky, towards which the water freely radiates its heat. The pans are placed upon layers of straw to reduce the flow of heat from the ground to the water; this results in the water radiating heat more quickly than it gains it by conduction until it finally freezes.

By the 19th century natural ice had become an article of commerce and the principles leading to its manufacture were being estab-



Ice-making. Fig. 1. Compressor type of plant, showing the lay-out at the end of the freezing tanks for thawing, tipping, and filling.
Both diagrams, courtesy of York Shipley, Ltd.

lished. Galileo's thermometer, Boyle's and Charles's laws of gases, and Priestley's discovery of ammonia, oxygen, and carbon dioxide were stepping stones to mechanical refrigeration. In 1823 Faraday liquefied ammonia and carbon dioxide by pressure; a year later Carnot developed the principle of the ideal heat cycle in a closed reversible process. The first machine to produce ice commercially was invented by Carré in 1860: it was of the ammonia absorption type and at first crude. In 1862 Kirk designed an air-refrigerating machine which gave good service in an ice-making factory in Hong Kong.

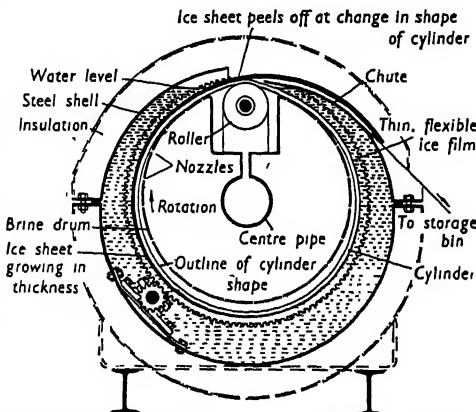
The compressor type of plant, using ammonia or some other refrigerant, is commonly used in ice-making. The usual method is the can system, in which water to be frozen is enclosed in cans and immersed in brine tanks. Evaporator coils for chilling the brine are accommodated in trunks and alongside the can space, the brine being circulated through the coil trunk, distributed evenly between the cans. The water on cooling liberates its dissolved air and, unless the water is agitated, the bubbles become frozen into the mass, producing opaque ice. Agitation can be obtained by injecting dehumidified air into the water

during freezing. Clear ice grows steadily inwards from the sides of the can towards the central air stream until only a thin core of opaque, spongy ice is formed.

When freezing is completed, the cans are lifted in groups, dipped in tepid water to thaw the surfaces, and tilted to release the blocks. The heat for thawing can be supplied from the condensers of the refrigerating plant. Fig. 1 shows a typical lay-out at the end of the freezing tanks.

Domestic refrigerators generally allow for making a small quantity of ice in open divided trays. This idea has been developed commercially in the form of cabinets filled with ice trays.

Another method of ice-making is the continuous ribbon process, in which thin strips of ice are peeled from a rotating drum and broken into flakes of dry, sub-cooled ice. The machine (Fig. 2) consists of a tank containing fresh water in which a rotating flexible



Ice-making. Fig. 2. Diagram showing a cross section of the continuous ribbon process

cylinder is almost totally submerged. The cylinder is made up of thin metal belts about 6 ins. wide, forming freezing surfaces separated by rubber strips. Brine is ejected from the inner drum through nozzles on to the inner surfaces of the freezing cylinders, and ice forms on the exterior surfaces in ribbons. The roller, at the topmost point of travel, distorts the cylinder from its normal shape, causing the ice to peel off, fall into the bin, and shatter into fragments.

Hugh Bell, A.M.I.E.V.E.

Iceni. Pre-Belgic tribe inhabiting E. Anglia at the time of the Roman invasion of Britain. They submitted to the Romans, but rebelled under their queen Boadicea, A.D. 62, and shared her defeat. Venta Icenorum (Caistor-by-Norwich) was one of their chief towns in the Roman period.

Ice Pack. Term used for small masses of sea ice or broken fragments of icebergs driven together by wind or currents. They form a more or less compact barrier to navigation in the Polar regions, according as they are being driven towards or off the land. Often the ice pack contains clear channels through which vessels can pass, and even when presenting an apparently continuous sheet of ice it is loose enough for steamers to plough through. See Polar Regions.

Ice-plant (*Meibryanthemum crystallinum*). Annual herb of the family Picroideae. It is a native of S. Africa, the Canaries, etc. It is dotted all over with glittering raised glands which have the appearance of clear ice. Its stems lie along the ground, and its alternate, oval leaves clasp the stems by their base. The plant is a favourite one for rockeries and flower borders in warm countries, though in Great Britain it is usually grown in greenhouses. The flowers are white, yellow, or red. *M. cordifolium* has heart-shaped green and silvery leaves and bright reddish-purple flowers.

Ice Sailing. Sailing and racing specially built yachts upon ice. The U.S.A. and Canada offer the most favourable conditions for the sport, but it is also practised in Norway, Sweden, the Gulf of Finland, the Netherlands, and to a small extent in Great Britain, where Esthwaite Water, Windermere, and Rydal Water are occasionally frozen sufficiently to support the weight of a small yacht.

The modern ice-yacht consists of a triangular frame moving upon two steel runners, the long steel

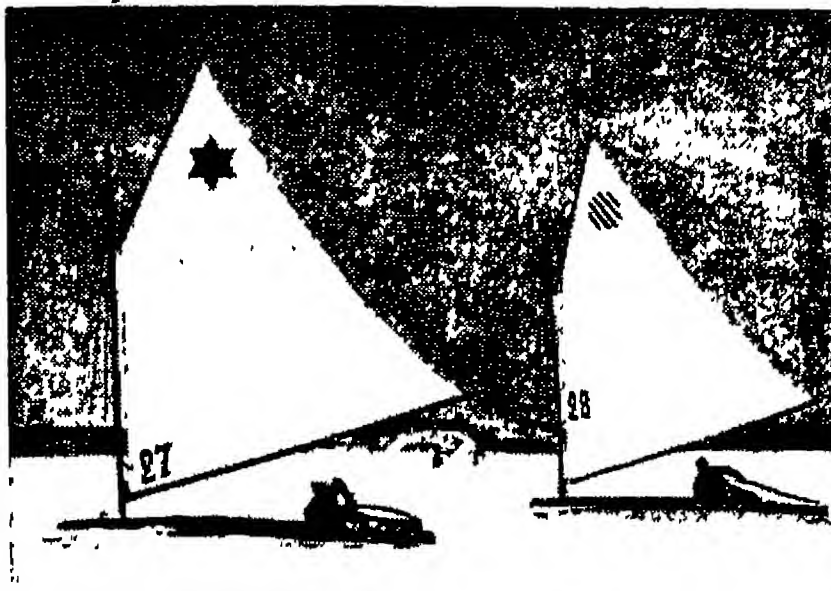
rudder virtually acting as a third. The mast is placed well forward, and the bowsprit is formed by a continuation of the centre timber. The sails usually are mainsail and jib. The tiller is often made very long so that the helmsman can steer with his legs, leaving his hands free to manipulate the sails. Some American and Canadian ice-yachts are 40 ft. in length, and carry six passengers, attaining a speed of 80 m.p.h.; they are suitable for navigation only on large expanses of ice. On the canals of Holland ice-boats are invariably put to practical purposes and not employed in racing.

Ice Saints. Name given to the period May 11-13, i.e. the days of S. Mamertius, S. Pancras, and S. Gervais, respectively, owing to the belief derived from folklore that a frosty spell is to be expected at this time. Although Buchan found a tendency for the period May 9-14 to be cold in parts of Scotland during 1857-66, there is no statistical evidence that such a spell recurs generally.

Ice Sheet. Term applied either to the ice cap which covers the whole of the South Polar region, or to the ice shelves which cover the sea off the coast of the Antarctic continent. In its first connotation it is also used to describe the ice caps found locally in Greenland and Ellesmere Island. See Ice Cap; Ice Shelf.

Ice Shelf. Expanse of floating ice off the coast of the Antarctic continent. Ice shelves are permanent formations, aground at the landward side and anchored by the glaciers which feed them, flowing into them from the South Polar ice cap; on the oceanward side they are afloat, and terminate in sheer cliffs rising in places over 200 ft. (ice barriers), and descending to nearly 1,500 ft. below.

The surface of the ice shelves is mainly flat, but internal stresses caused by the glaciers which enter them from different directions give rise to irregularities. These sometimes take curious forms, and are known as pressure ice. The seaward side of the ice shelves is constantly breaking off into large icebergs, a process known as calving. The largest ice shelves in the Antarctic Ocean are the Ross, in the Ross Sea, and the Filchner, in the Waddell Sea. See Ice Barrier.

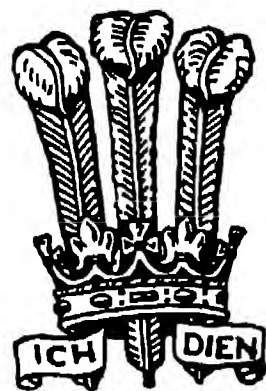


Ice Sailing. Yacht racing during the Northern Games at Värtan, Sweden

Ichabod (Heb., no glory). Son of Phinehas, and grandson of Eli (1 Sam. 4). Just before his birth his mother heard of the death of her husband and father-in-law, that Israel had been defeated, and the Ark taken. With her dying breath she named her child Ichabod, saying "The glory is departed from Israel."

Ichang. Town in Hupeh province of China. It is situated on the Yang-tse, 270 m. above Hankow, and 965 m. from the mouth, and is accessible to small river steamers. It was opened to foreign trade in 1877. Above the town the great rapids of the Yang-tse hinder navigation from the rich western provinces, Szechwan in particular. A short rly. to Kweichow beside the stream gets over the difficulty in part. Pop. 107,940.

Ich Dien (Ger., I serve). Motto borne by every prince of Wales. It was erroneously said to have been adopted by the Black Prince, together with the three white ostrich plumes, from John, king of Bohemia, who was slain during the battle of Crécy, while fighting in the service of the king of France.



Ich Dien. Prince of Wales's crest and motto

Ichneumon OR MONGOOSE (*Herpestes ichneumon*). Small carnivorous mammal, which occurs in Egypt and India. The name means tracker (Gr. *ichneuein*, to track, hunt out). See Mongoose.

Ichneumon Fly. One of a large group of insects belonging to the order Hymenoptera (q.v.) and known as the Ichneumonoidea. They are of minute to moderate size, with thread-like antennae, elongated bodies and legs, and needle-like ovipositors, sometimes as long as the rest of the insect. In their larval stages they live as

parasites, especially on caterpillars. The female lays her eggs on the skin of the host, or more often bores through it, thus depositing her eggs internally.

On emerging, the ichneumon fly larva either lives on the integument of the host, feeding through a perforation; or lies immersed in the blood of the host, devouring the nearby tissues. In either event death of the host almost always supervenes and the ichneumon fly larva pupates either within or outside its remains. The way of life of ichneumon flies renders them useful agents in checking the abundance of noxious insects. More than 2,800 species occur in Great Britain. Consult Entomophagous Insects, C. P. Clausen, 1940.

Ichor (Gr.). In Greek mythology, the ethereal juice or fluid, different from blood, which coursed through the veins of the gods. As a medical term, ichor indicates a watery humour or discharge from a wound or ulcer.

Ichthyol (Gr. *ichthys*, fish; Lat. *oleum*, oil) OR ICHTHAMMOL. Adhesive brown substance with a tarry odour and rich in organic sulphur compounds. It is prepared by the distillation of a bituminous shale containing the remains of fossil fish. Found in Tirol, ichthyol and its preparations are used for the treatment of eczema and other skin diseases, including (in photography) developer poisoning. They are mildly antiseptic in action.

Ichthyology (Gr. *ichthys*, fish; *logos*, word). Science of fishes. It is the scientific name given to the branch of zoology that treats of the structure, form, and habits of fishes, also their classification. See Fish; Zoology.

Ichthyophagi (Gr., fish-eaters). Primitive coast-peoples reputed by ancient geographers to subsist on sea-food. Alexander the Great's admiral Nearchus described those of the Gedrosian coast—the Baluchistan Makran—as giving fish to their domestic animals also, and occupying whalebone and conch-shell dwellings. Herodotus referred to those of the Red Sea coasts.



Ichneumon Fly. Specimen of *Ophion luteum*

Ichthyopterygii. Grade of vertebrates in which the limbs are fins. They are contrasted with Cheiropterygii, creatures having fore and hind limbs, as in the tetrapods. The grade includes all true fish from sharks upwards.

Ichthyornis. Extinct toothed bird. From remains which have been found in the middle Cretaceous of Kansas, it was a strong-flying bird, about a foot in height, and possessing a row of reptile teeth in each jaw. A sea-bird, it fed on fish and nested on the shore. *See* Bird; Fossil.

Ichthyosaurus (Gr. *ichthys*, fish; *sauros*, lizard). Genus of extinct fishlike reptiles found in the Triassic, Jurassic, and Cretaceous strata in Europe, America, Africa, and Australia. The reptile has been reconstructed from fossil remains and had a round and tapering body, and a large head with long jaws armed with a number of sharp, conical teeth. The neck was extremely short, the limbs like flappers or fins, resembling those of whales, and the tail a vertical fin. The body was covered with a smooth skin, and the reptiles measured anything from 4 to 40 ft. in length. Fossil remains show that they must once have been present in large numbers in European seas. Over thirty different species have been found. *See* Fossil; Reptile.

Ichthyosis or **XERODERMA**. Congenital hypertrophy of the horny layer of the skin, also called fish-skin disease. The cause is unknown, but the thyroid gland plays some part in giving rise to the condition. All types are characterised by rough, dry, scaly, and dirty brown skin, sometimes over a large area of the body. Warm baths with sodium bicarbonate are sometimes helpful.

Icknield Way. Anglo-Saxon name of the important prehistoric ridgeway which follows the line of the Berkshire Downs and Chiltern Hills from near Wantage to Dunstable, and continues as a track, in parts built up as a Roman road, to Royston, Thetford, and north to Hunstanton. In some hilly places there are upper and lower tracks for winter and summer travel respectively. Rycknield, sometimes called Icknield, Street is the Roman road Derby-Lichfield-Birmingham-Alcester. Icknield Way, probably the first of these, ranked as one of Edward the Confessor's four royal roads.

Icon or **IKON** (Gr. *eikōn*, image, likeness). In the Greek or Orthodox Eastern (including the Russian) Church, a representation in



Icon. Examples of ancient Russian types; left, representing S. John Baptist; right, the Annunciation

the form of painting, low-relief sculpture, or mosaic, of some sacred personage. In a Russian or Balkan church the *bema*, or sanctuary, is separated from the body of the building by the *iconostasis*, a carved screen of wood or stone, on which the icons—usually half-lengths—of the Saviour, Mary, the Apostles, and the Saints are painted, frequently on a ground of yellow or gold. Excepting the face and hands, the whole is often covered with a metal plaque embossed so as to represent the figure and drapery. Icons are common in the streets of towns and villages, and are venerated by the peasants, who generally carry them in the shape of folding tablets, with coloured or enamelled pictures.

Iconium (Gr. *Ikonion*). Ancient city of Asia Minor. It figures in the travels of S. Paul, and was the capital of the Roman prov. of Lycaonia. It was taken by the Arabs in 708, and during the Seljuk period was the chief town of the sultanate of Iconium or Rum. After several vicissitudes it was captured by the Turks in 1486. Its modern representative is Koniëh or Konya, 300 m. E. of Izmir.

Iconoclast (Gr. *eikonoklastai*, image-breakers). Name applied to an opponent of the use of images and pictures in religious worship. From early Christian times, pictures and other representations of sacred persons and emblems were used in the adornment of places of worship, and as early as the 2nd century protests were made against a practice which appeared dangerous in view of the idolatry with which the Church was surrounded. Tertullian and Origen both adopted this attitude; and the council of Illiberis (c. 305) forbade pictures in churches. Eusebius and Augustine also prohibited them, and Epiphanius, bishop of Constantia

(A.D. 367), destroyed a picture of Christ in a church in Palestine.

But the practice became general, and in the 8th century the rise of a party of iconoclasts in Eastern Europe started a prolonged controversy. The Eastern emperors issued edicts forbidding the veneration of pictures or images, while the popes inclined in the opposite direction. The council of Constantinople, 754, forbade image worship, but without permanent effect, for by 842 the iconoclasts were completely defeated. The name Iconoclasts has also been given to the Puritan party in the 16th and 17th centuries who endeavoured to destroy every kind of pictorial or sculptural adornment in churches, including stained glass windows. *See* Idolatry; Image Worship.

Iconography. Name given to the art of arranging and classifying prints and other illustrations of persons. For instance, an iconography of Chaucer would be an account of all the prints illustrating his life and works.

Icosahedron. Regular solid contained by twenty plane faces, each of which is an equilateral triangle. It is one of the five regular or Platonic solids.

Ictinus (Gr. *Iktinos*). Athenian architect. Little is known of him except that in the 5th century B.C. he was associated with Callicrates in the design and building of the Parthenon under the direction of Pheidias. He was also architect of a so-called temple at Eleusis and of the temple of Apollo Epikourios (helper) at Bassae, in Arcadia.

Id (Lat., that or thing). Term used in Freudian psychology for that part of the mind which is not modified by experience; e.g. the basic instincts which every child inherits as a member of the human race. In normal people Id im-

pulses are repressed so early in childhood that they hardly become effective in their primitive form. In some forms of mental illness the controlling powers fail and an impulse emerges undisguised; e.g. the desire to kill of a homicidal maniac.

Ida (Turk. Kaz Dag). Classical name of a mountain range in modern Turkey. It stretched from Phrygia through Mysia into the Troad. Mt. Gargarus, 5,750 ft., is near the head of the Gulf of Adramyti (Edremid).

There is a Mount Ida (8,193 ft.) in Crete.

Ida (d. 559). King of Bernicia. He probably founded this little English kingdom, over which he ruled 547-59. He fortified Bamborough, his capital, and left Bernicia to his sons, six of whom were in turn its rulers.

Idaho. North-western state of the U.S.A. It touches British Columbia to the N. Its area of 83,557 sq. m., approximately that of England and Scotland, comprises a tableland with mean elevation of 4,500 ft. and many snow-capped peaks exceeding 12,000 ft. Within the Rocky Mountain region, outlying ranges, interspersed with narrow valleys, cover the N.E., while the S. presents a vast lava plain. The central portion of narrow valleys and virtually impassable cañons drained by the Salmon and Clearwater rivers is sparsely inhabited. Forests cover more than a third of the state.

The Snake river, whose navigation is obstructed by magnificent falls, bisects Idaho in the S. and turns N. to form part of the W. boundary. It drains most of the area, which forms part of the Columbia Basin. Agriculture is indebted to irrigation as the soil is arid except where derived from lava rock in the S. and centre. Several of the nation's largest reservoirs and dams are here.

Idaho is one of the leaders in output of silver, lead, zinc, copper, gold, antimony, and mercury. Its potatoes are famous and it yields more apples than any other state save Washington. Other products are wheat, alfalfa, oats, barley, sugar beet, pears, prunes, meat, wool, and dairy products. Cattle and sheep are raised. Timber includes western and white pine, larch, and Douglas fir. Among industrial establishments are beet sugar factories, flour mills, saw-mills, and fruit canneries.

Six state educational institutions include the university at Moscow and the college at Caldwell.

Chief rlys. are the Great Northern and Union Pacific, the total steam rly. track being 2,870 m. Two senators and two representatives are sent to congress. Boise is the capital (pop. 34,393). Lewis and Clark explored Idaho in 1805-06, Mormons were the first permanent settlers, 1842, and the state was admitted to the Union on July 3, 1890. Some 4,000 Indians live in reservations. Pop. (1950) 588,637. *Pron.* Ida-hō. *Consult* We Sagebrush Folks, A. Greenwood, 1934.

Idalium (Gr. Idalion). Ancient city of Cyprus, now represented by Dali. It stood in the valley of the Idalia, 13 m. S.E. of Nicosia. In the vicinity were a forest and temple sacred to Aphrodite, who was sometimes called Idalia. Excavations made between the First and Second Great Wars yielded coins and inscriptions.

Idar. Former state of India, merged in Bombay in 1948. It lay N. E. of Baroda, S. W. of Mewar, covering about 1,905 sq. m. The ruler was a Rajput of the Rathod clan, his dynasty being an offshoot of the Marwar. Himmatnagar, 55 m. N.E. of Ahmadabad, was the chief town. Agriculture is the leading occupation of the area, products being mangoes, sugar cane, oil-seeds, and cereals.

Idas. In Greek legend, one of the Argonauts. Marpessa chose him for her husband in preference to Apollo, and the offended god attempted to abduct her, but was compelled to relinquish her to Idas, who pursued him with bow and arrows. Idas and his brother Lynceus had a famous fight with the twins Castor and Pollux, the quarrel having arisen about the division of some captured oxen. Idas killed Castor, but Lynceus was killed by Pollux; whereupon Zeus, the father of the twins, slew Idas with a thunderbolt.

Iddesleigh, STAFFORD HENRY NORTHCOTE, 1ST EARL OF (1818-87). British politician. Born in London, Oct. 27, 1818, of a Devon family, he was educated at Eton and Balliol College, Oxford. He became a barrister, and in 1843 private secretary to Gladstone. In



Stafford Northcote,
1st Earl of Iddesleigh

1851 he succeeded to the family baronetcy and estates, and in 1855 entered the house of commons as M.P. for Dudley. In 1866 he was president of the board of trade in

the Conservative cabinet, and next year secretary for India.

His party was out of power until 1874, when Northcote became chancellor of the exchequer. In this office he introduced the new sinking fund. In 1876, on Disraeli's transfer to the lords, he succeeded him as leader of the commons. He remained chancellor until 1880, and leader until 1885, when party differences resulted in his removal to the lords as earl of Iddesleigh. He was first lord of the treasury in 1885, and foreign secretary in 1886, but had just resigned when he died suddenly at 10, Downing Street, Jan. 12, 1887. He wrote *Twenty Years of Financial Policy*, 1862. *His Life* was written by Andrew Lang, 1890. The title came in 1927 to Henry Stafford Northcote, 3rd earl (b. 1901).

Idea (Gr., form, kind, sort). Philosophical term introduced by Plato. According to him, the idea is the perfect eternal archetype, the original model of which individual objects are the imperfect images. He further assumed an idea for every class of existence—an idea not only of a table or chair, of virtue, but even of mere relation and quality. There are as many ideas as there are kinds of things, all controlled by the idea of the good. The two chief elements of the Platonic idea are the general notion and substantial, independent existence. The concepts, by which we think what we perceive by the senses, are general, unalterable, and consequently real.

In French and English philosophy, since Descartes and Locke, the meaning of the word has entirely altered. It is used for the representation of a thing in the mind, the notion formed by the subject of something else called the object, an act of reason as contrasted with an act of perception. There are two chief views as to the origin of ideas: that they are derived entirely, directly or indirectly from experience, without the assistance of reason; that the knowledge supplied by experience, being relative and contingent, has to be supplemented by reason. *See* Metaphysics; Philosophy.

Ideal Husband, AN. Comedy by Oscar Wilde, produced Jan. 3, 1895, at The Haymarket, where it ran for 119 continuous performances. Lewis Waller and Julia Neilson played the leading parts. A revival at Westminster Theatre, 1943, ran longer than the original production. A film version was produced in 1947.

Idealism. Theoretical idealism, as contrasted with practical idealism, or striving after a standard of perfection, may be considered (1) as connected with the theory of knowledge, (2) metaphysically. Knowledge has to do with our own conceptions, never directly with the things of the external world in themselves. There can be no object without a subject.

The first who laid stress on this attitude was Descartes, who asked what right we had to believe that there existed external objects corresponding to our conceptions. Spinoza and Leibniz held that the mind drew knowledge from itself, although admitting that the reality corresponded to the internal ideas of the mind. Berkeley went further, declaring the universe to be nothing but a collection of mental perceptions, put before us by the supreme mind or spirit. Kant adopted a middle course—that external things were only phenomena (appearances) for the subject; that the possibility of knowing objects of experience was conditioned by space and time, whereby things are so altered that we do not know them as they really are, but only as they appear through those subjective media. (2) Metaphysical idealism holds that only intellectual principles are the really existent, not inanimate matter, and the blind forces of nature. See Hegel; Philosophy.

Identification (Lat. *idem*, the same; *facere*, to make). Term used in English law. Identification is often a matter of legal importance. The finger-print system has eliminated some of the risks of mistake of identity, but there is always the chance that an honest but unobservant person may mistake an innocent person for a guilty. When A has been arrested on suspicion of being a wanted criminal, and B is the person who saw the crime committed, it is usual for the police to collect a number of men in the prison yard together with A, and then to ask B to point out the man whom he saw commit the crime. Identity can be established, not only by swearing to his face, but to any physical peculiarity, to the voice, or even the clothes of the person to be identified. It is, however, always a question of fact; and no one ought to be convicted unless evidence of identity is so strong as to leave no reasonable doubt. See Finger-Print.

Identification. Psychological term for the process whereby a person's emotions are so merged in

those of another that the one feels and behaves as the other does. In many instances this occurs unconsciously. For example, one person may actually feel pain when he sees another suffering, or he may copy the mannerisms and habits and adopt the standards and beliefs of another without realizing it. Where two persons are unconsciously identified the attributes and emotions associated with the one may be transferred to the other, e.g. a good ruler may be identified with a loved father and receive loyalty and obedience. Or all authority may occasion fear and hostility as a result of the fear produced by a cruel and dominating father.

Identification may be conscious, e.g. when a girl identifies herself with a film star, or a boy identifies himself with the hero in a book. This form of identification is closely related to introjection, *q.v.*

Identity (Lat. *idem*, same). The condition of being the same and not something else. An indispensable first principle of reasoning is that everything remains identical with itself unless it is subjected to modification: this is expressed by $A=A$. Personal identity is the continuation of personality (*q.v.*).

Identity Card. A certificate of identity carried by British civilians during 1939–52. Under the National Registration Act, 1939, a civilian identity card was issued on Sept. 30, 1939, in exchange for a completed national registration form, to every British civilian resident in the U.K. and thereafter to all persons born or coming to reside in the U.K. The card gave the national registration number, full name, class code, and current address. A police constable in uniform could require the production of the card either to him at the time or at a police station within two days. A national registration officer could require the production of a card at his office, and a member of the armed forces could require it from a suspected deserter or absentee. The card could also be used as evidence of identity in e.g. claiming a postal packet. Those who had national registration numbers continued to use them in connexion with the national health service. Need to possess an identity card was abolished Feb. 21, 1952.

Identity Disk. Means of identification worn by members of the fighting and civil defence services in wartime. Those issued to the



Identity Disk. Types issued to the British services in both Great Wars. Left, red; right, green

British forces during the Second Great War followed the pattern introduced in 1916. They consisted of two vulcanised fibre disks stamped with the wearer's number, name, and religious denomination. The disks were of two forms, green and octagonal, red and circular; the first was worn on a cord round the neck, and the second attached to it. If the wearer was killed, the green disk was buried with the body and the red detached and sent to higher authority as evidence of death. In the U.S.A. and Germany, the identity disk was of light metal and perforated; the lower half was broken off if the wearer became a casualty. Similar disks were issued by the Germans to prisoners of war in their hands. Many civilians voluntarily wore disks to establish their identity in the event of their being killed or injured in air raids.

Ides (Lat. *iduer*, to divide). In the Roman calendar, the name of the 13th day of the month, except in March, May, July, and Oct., when the Ides fell on the 15th. See Calendar; Kalends.

Idiocy. Condition of extreme feeble-mindedness present at birth or in early childhood. The cause may be prenatal, the child springing from neuropathic stock. The most frequent causes at birth are prolonged labour or instrumental delivery, leading to injury to the brain. Sometimes the condition follows infantile convulsions. Various forms of idiocy, presenting different degrees of severity, are recognized. Idiots of the lowest type lead a more or less automatic life. They may be silent or utter meaningless cries, and have to be fed, dressed, and kept clean. Others acquire some degree of speech.

Imbecility is a term applied to degrees of feeble-mindedness above the lowest. If the mental age of an idiot is 3, that of an imbecile is 7, as assessed by intelligence test (*q.v.*). Idiots and imbeciles frequently show physical defects and deformities. Some are born blind, some suffer from short-sightedness, squint, and other ocular

defects. Deafness may be present. The stature is often small, the palate high, the forehead receding, and the head misshapen. The teeth are badly formed and signs of rickets are often present. The power of speech is slowly acquired, and may reach only a low standard. Stammering is frequent. Some idiots never learn to walk, others do not walk until much later than normal children, and then often in a clumsy manner. *See Mental Disorder.*

Idle. River of Nottinghamshire, England. Formed by the junction of the Maun and the Meden, it flows mainly N. from Sherwood Forest until it joins the Trent at W. Stockwith. Its length is about 40 m. In 617 a battle was fought on its banks between the kings of Bernicia and East Anglia. Ethelfrith of Bernicia was slain and his army routed.

Idle. District of Bradford, Yorkshire, England. Standing on the river Aire, it is 3 m. from the centre of the city, and has its own rly. station. A canal flows through it, and it is served by trolley-buses. Holy Trinity is the chief church. The manufacture of woollen goods is the principal industry. From a village Idle became a manufacturing centre, and in 1899 was included in Bradford (*q.v.*).

Ido. Universal language developed from Esperanto in 1907 by Couturat and de Beaufront. The name is an Esperanto word meaning offspring, and Ido is claimed to be Esperanto rendered more scientific and natural by the elimination of certain inflexions and rules of agreement. De Beaufront published a book on it in 1919. *See Esperanto; Universal Language; Volapük.*

Idocrase, OR VESUVIANITE. A complex basic silicate of calcium and aluminium, with some replacement by iron, magnesium, etc. It occurs as brown or greenish tetragonal crystals or massive, sometimes resembling garnet, with which it is associated in impure metamorphosed limestones at Vesuvius and in Scotland. The compact green variety (californite) found in California resembles jade. Other varieties are viluite, egeran, cyprine, and colophonite. Idocrase has application as an ornamental or semi-precious gemstone.

Idolatry (Gr. *eidōlon*, idol; *latreia*, worship). Literally the worship of idols. In Judaism, Christianity, and Mahomedanism the word implies the worship of any but the Supreme Being, or the love or veneration of anything

that comes between the Supreme Being and the soul of man.

In the history of man idolatry has a place between animism or nature worship, ancestor worship, and belief in one true God. The idol was evolved when the first attempt was made to represent the unseen spirit by an image, and the virtues of that spirit were attributed to the representation or image. Animals and celestial bodies became objects of worship, and by degrees were represented in human or human-animal form. The sun-worshipper became the worshipper of Baal; the moon-worshipper the worshipper of Ashtoreth, both being represented by images or idols.

The references in the O.T. to false gods or idols are numerous, and reflect the early relations between the Semites and Babylonia. Before the law was given definite form in Deuteronomy the Israelites often relapsed into the practices of the forefathers of Abraham; they were surrounded by idolatrous peoples. The law, as finally delivered, made idolatry punishable by death. The word idolatry is used once in the O.T. (1 Sam. 15, v. 23), frequently in the N.T., where, and in the writings of the fathers, warnings are given against the worship of pagan gods under some kind of bodily representation. Later it was found that, just as the Jews worshipped idols in the belief that they were paying homage to Jehovah, so, if bodily representations of the Supreme Being were permitted, the Christian religion might be associated with idolatry.

This view is represented by the Puritan ideal. The R.C. Church defends the use of images partly because God Himself assumed human form in the person of Jesus Christ, partly because such images as that of Christ on the Cross help to bring vividly before the devout the meaning of their worship, and maintains that homage is paid not to the image but to the prototype. *See Animal Worship; Animism; Fetishism; Iconoclast; Image Worship; Religion.*

Idomeneus. In Greek legend, king of Crete and grandson of Minos. Caught in a storm on the return journey after the Trojan War, he vowed to sacrifice to Poseidon the first thing that met him if he reached home safely. The first person to greet him on the shore of Crete was his own son, whom he was therefore compelled to sacrifice. As a result, a plague descended upon the country, and Idomeneus was driven into exile by his people. *Pron.* I-dommy-nēuce.

Idria. Town of Yugoslavia, formerly in the Italian prov. of Gorizia. Standing on the river Idriza, 25 m. W. of Ljubljana, it is famous for its quicksilver mines, which have been worked since 1580, and formerly yielded some 500 tons of metal a year. The mine office is in the château of Gewerkenegg, built in 1527. Formerly in the Austrian prov. of Carniola, Idria became Italian after the First Great War, and was transferred to Yugoslavia by the peace treaty of 1947.

Idrian Process. One of the chief methods by which mercury or quicksilver is extracted from its ores, so called because it was first adopted at the famous quicksilver mines of Idria (*v.s.*). The heating of the ore is carried out in a central furnace, having a series of arches one above the other on which graded ore is piled, the coarse on the bottom and the fine on the top arch. The condensation is carried out in a series of brick chambers on each side of the furnace into which the gases from the furnace carrying the volatilised metal pass, and in which the metal condenses and collects. *See Mercury.*

Idris. Welsh legendary figure. His rough-hewn rocky seat on the summit of Cader Idris, Merionethshire, was said to inspire or drive mad any bard who spent a night on it. Mrs. Hemans used the legend in one of her poems. *See Cader Idris.*

Idro. Lake of Italy. It is in the prov. of Brescia, on the border of the Trentino. Situated between Lago d'Iseo on the W. and Lago di Garda on the E., 16 m. N. of Brescia, it is 7 m. in length from N. to S., 1½ m. wide, and 400 ft. in depth. The Chiese, an affluent of the Po, runs through it. The Romans called the lake Edrinus lacus.

Idumea OR EDOM. In Biblical times, the high mountainous region lying S. of the Dead Sea. In Roman days Idumea formed the N. part of Arabia Petraea and the S. part of Judaea up to Hebron. The name means the red land.

Idun. In Scandinavian mythology, the goddess personifying spring, and the keeper of a box of golden apples from which the gods renewed their youth. When she was stolen by Thiassi, the winter god, and imprisoned in the nether world, the gods began to grow old without their apples, and planned her rescue. Restoring her to freedom in the spring, the gods again received the magic apples and grew young.

Idyll or **IDYL** (Gr. *eidyllion*, little picture). This term generally denotes a short, descriptive pastoral poem, such as those of Bion, Moschus, and Theocritus in classical times. Tennyson gave a broader definition to the term in his *Idylls of the King* (v.i.).

Idylls of the King. A series of poems in blank verse by Lord Tennyson, the first of which was published in 1859. Mostly founded on Malory's *Morte d'Arthur*, they present in an imaginative and descriptive manner stories connected with King Arthur and his Round Table. There are further an introductory poem on *The Coming of Arthur*, and a closing one on *The Passing of Arthur*.

If. Small island in the Gulf of Lions, France. It lies 2 m. off Marseilles, and its castle, the



If, the Mediterranean island, and the château, long used as a prison, as described in *The Count of Monte Cristo*

château d'If, long used as a prison, was built by Francis I about 1530. It figures in Dumas' *Count of Monte Cristo*.

Ifney. Village of Oxfordshire, England. It stands on the left bank of the R. Thames, 2 miles S.S.E. of Oxford. There is a Norman church, S. Mary's, which has a famous doorway with rich chevron ornamentation and some interior features of interest. See *Gothic Architecture* illus.

Ifni. Small port on the coast of the Spanish Sahara. It lies on a creek 50 m. S.S.W. of Agadir. Ifni was ceded to Spain by Morocco in 1860, but was not effectively occupied until 1934. It has a carrying trade with the interior. Ifni territory includes 741 sq. m. with 35,000 inhabitants. Its S. boundary is the river Asaka.

Ifrit, IFREET, or AFREET. In Arabian folklore, a terrible demon malignant towards man, and appearing in a column of smoke.

Igarka. A river port of Krasnoyarsk territory, R.S.F.S.R., on the right bank of the Yenisei river, about 400 m. from the Kara Sea. Its industries are timber sawing and shipping. Although it is within the Arctic Circle, work proceeds in winter with the aid of heating systems and floodlighting, except in a temperature below -85°F . Pop. (est.) 25,000.

Igharghar Wadi. Ancient river bed of the N. Sahara, N. Africa. It had its source in the plateau region of Hoggar or Ahaggar, in the N.-central Sahara, at an alt. of 6,000 ft., and flowed to the Shott Melrhir, a depressed salt lake in the dept. of Constantine, Algeria. Its waters have disappeared, and its whole course of 800 m. is now a boulder-strewn, sand-swept valley.

Iglesias. A city of Sardinia, Italy. Near the W. coast, it is 34 m. by rly. W. of Cagliari, in the centre of the Iglesiente, a lead and zinc mining region. Its Pisan-built walls, citadel, and towers are now dilapidated. It contains a cathedral, built in 1285, a beautiful episcopal palace, the remains of an Aragonese castle, several notable churches, and a school of mining. The mines employ many, and minerals are exported. Pop. 22,000.

Igloo. Snow house used between Nov. and March by the Eskimos of the Canadian mainland between Hudson Bay and Cape Parry and of the islands N. of Canada. It is built in dome form of snow

blocks about 4 ins. thick; the inside of the wall is sometimes strengthened by raising it to melting point for half an hour and then allowing it to freeze again, so that a hard glaze of ice binds it together. See *Eskimo*.

Ignatius. Patriarch of Antioch and Apostolic Father. Nothing is known of his early days, though it

is probable that he was a disciple of S. John. According to Eusebius, he was the second bishop of Antioch, after S. Peter, who is believed to have been bishop there before going to Rome. About 116 Ignatius was seized during the persecution under Trajan and taken to Rome to be thrown to the lions. On the journey he wrote the important Ignatian Epistles, which have been a fruitful subject of dispute among the critics. They are addressed to various churches, urge unity and obedience to bishops, and warn against Gnosticism and other errors. Consult Saint Ignatius, C. Hollis, 1931.

Ignatius, FATHER (1837-1908). Anglican preacher, whose real name

was Joseph Leycester Lyne. Born at Barking, Nov. 23, 1837, he was educated at S. Paul's and ordained in 1860. After serving as a curate he adopted the Benedictine habit and styled himself Father Ignatius. In 1870 he built Llanthony Abbey, among the mountains some miles from Abergavenny, as the home of an Anglican Benedictine order, but his eccentricities defeated his attempts to form a community. He was an eloquent preacher, whose mission services attracted large congregations both in Great Britain and in the U.S.A. In his later years he attacked the Broad Church party. He died Oct. 16, 1908.

Ignatius Loyola. See Loyola, Ignatius.

Ignatius's Bean (*Strychnos ignatii*). Tree of the family Loganiaceae, native to the Philippines. The seeds are intensely bitter and contain a high percentage of strychnine.

Igneous Rocks. (Lat. *ignis*, fire.) Rocks consolidated from molten material. They can be classified according, first, to their mode of occurrence: (1) extrusive, lavas which have been poured out on the land surface or sea floor from volcanoes; (2) hypabyssal, which have been injected while fluid into cracks and fissures, or form minor masses, at no great depths below the surface; (3) plutonic, which form large masses, and have cooled slowly, deep in the earth's crust. The three classes usually show characteristic variations in texture. Plutonic rocks are made up of interlocking crystals clearly visible to the naked eye. Hypabyssal rocks are similar, but of a finer grain; commonly isolated crystals of a particular mineral lie embedded in a finer mass, yielding a porphyritic texture. Extrusive rocks usually are finely crystalline; they may show a small-scale porphyritic texture, or may be chilled to solidify as a volcanic glass.

Igneous rocks are also classified according to their chemical composition. Rocks which have a 72-65 p.c. content of silica (SiO_2) are termed acid; intermediate rocks carry about 65-57 p.c.; basic rocks about 55-48 p.c.; and ultrabasic less than 45 p.c. SiO_2 . Thus acid rocks contain free quartz, and



Father Ignatius, Anglican preacher Elliott & Fry



Ignatius, Patriarch of Antioch

CLASSIFICATION OF COMMON IGNEOUS ROCKS

	ACID	INTER-MEDIATE	BASIC	ULTRABASIC
Per-centage of SiO ₂	72-65	65-56	55-48	45
EXTRUSIVE Lavas	<i>Rhyolite</i> <i>Feldsite</i> <i>Obsidian</i> Trachyte Pitchstone	Andesite	Basalt Olivine-Basalt	
HYPABYSSAL Dykes, Sills, etc.	<i>Quartz Porphyry</i> <i>Aplite</i> <i>Pegmatite</i> Porphyry	Porphyrite	<i>Tholeiite</i> Dolerite Olivine-Dolerite	
PLUTONIC Deep Seated Masses	<i>Granite</i> Syenite	<i>Granodiorite</i> Diorite	Gabbro Norite Olivine Gabbro	Peridotite Serpentine Pyroxenite Hornblendite Dunite
Main Mineral Constituents	Quartz Muscovite Biotite OrthoclaseFeldspar and Albite	Hornblende Plagioclase Andesine to Labradorite	Puroxene Feldspar	Olivine No Feldspar

NOTE.—Italics indicate rocks which are so rich in silica that they contain free quartz.

basic or ultrabasic are composed largely of iron oxides, pyroxene, and/or olivine, poor in silica and rich in iron, calcium, and magnesium. Acid rocks likewise carry high percentages of potash and soda when compared with basic. They are also lighter in weight and colour.

Less common varieties of igneous rocks are the alkaline or feldspathoidal groups, which contain an excess of alkali (potash or soda) or are deficient in silica compared with the other constituents. The compositions of these rocks are such that the usual minerals are not produced, less common varieties—leucite, nepheline, aegirine, etc.—taking their places. See Geology ; Rock ; consult Igneous Rocks and the Depths of the Earth, R. A. Daly, 1933.

Gilbert Wilson, Ph.D.

Ignis Fatuus (Lat., foolish fire). Flickering flame due to marsh gas, sometimes seen floating over marshes and in places where there is decaying animal matter. The phenomenon has given rise to many superstitions, and is known by several other names, e.g. Will-o'-the-wisp and Jack-o'-Lantern.

Igniter. Small charge of gunpowder placed in a cartridge, which conveys the flash from firing tube or primer to the cordite. In Q.F. cartridges, which contain the charge in a brass case furnished

with a primer, the igniter sometimes consists of a small cylinder of cordite sewn to a shalloon bag of gunpowder. In B.L. cartridges the igniter is enclosed in a silk or shalloon bag sewn into the end of the cartridge (q.v.).

Ignition. Act of setting on fire or being made incandescent by heat. Generally ignition is accompanied or followed by combustion, as when a candle is lighted ; but a rod of platinum or a piece of porcelain or a cylinder of prepared lime, as used in limelight lantern apparatus, may be raised to incandescence without combustion taking place. The word is also used for the firing of the combustible mixtures at the proper time in an internal combustion engine.

Ignorance. Lack of knowledge of fact or law. In law it is held that *Ignorantia juris neminem excusat* (Ignorance of the law excuses no one), which may be stated positively : " Everyone is supposed to

know the law." The maxim is justified by the fact that conditions would be impossible if every law-breaker were allowed to excuse himself by the plea that he did not know he was breaking the law of the land. Ignorance of law is no defence in criminal cases, but in some cases it may be claimed to mitigate the seriousness of an offence.

Igorot. Primitive people of Indonesian stock in N. Luzon, Philippine Islands. Numbering perhaps 200,000, most of them in the mountains, they cultivate rice with digging-sticks on roughly embanked terraces. The village, economic and political unit, comprises bachelor and spinster houses, and family dwellings. They were formerly head-hunters.



Igorot. Man of this primitive Philippine people

Igualada. Town of Spain, in the prov. of Barcelona. It stands on the river Noya, about 25 m. by rly. N.W. of Barcelona, in a fertile district, surrounded by vineyards producing excellent wine. Manufactures include textiles, leather, soap, chocolate, and firearms. Pop. (1950) 16,945.

Iguana. Family of large lizards, found in the tropical regions of America and including about 300 species. The best known is *I. tuberculata*, about 5 ft. long, with a kind of fringe on its back and a very prominent dewlap. It is found in Central and S. America, and in the W. Indies, and spends most of its time in the trees. In colour greenish, with brown bands and bars, it is a fine swimmer and diver. It feeds mainly on fruits and leaves, and is quite inoffensive, though it can bite savagely if cornered, and can inflict severe blows with its tail. Its flesh is white and delicate, and in Mexico both it and its eggs are in demand. See Lizard.



Iguana. The large tropical American lizard, *Iguana tuberculata*

Iguanodon. Fossil land reptile, belonging to the Dinosaurs, found in the Jurassic and lower Cretaceous rocks of Europe. The first bones were found by Mantell in limestones of Tilgate Forest, and others were found in Belgium, 1878. In 1921 the footprint of one of these monsters was discovered at Glyne Gap, Bexhill. From these remains the iguanodon appears to have been 15 to 25 ft. long, with a small head, heavy jaws set with teeth like the modern iguana, and strong flexible lips. The animal, an herbivorous feeder, supported itself on its two hind legs and powerful tail, its front limbs being comparatively small. These fore limbs were provided with four toes and a bony spur, the use of which is unknown. The hind legs were three-toed. The animal inhabited swampy regions of England and the Continent, and from the remains must have existed in large numbers.

Iguassu OR IGUAZU. River of Brazil. In the state of Paraná, it flows W. to join the Alto Paraná at the frontiers of Brazil, Paraguay, and the Misiones territory of Argentina. It is famous for its cataracts, on the Argentine side, which are 40 ft. higher than those of Niagara and half as wide again. They are set in virgin forest, bright with multicoloured birds and butterflies, and festooned with creepers and orchids. Small steamers ply from Posadas nearly to the falls. Iguassu was the name of a strip of country facing Misiones, placed under direct presidential rule 1943-46.

Iguvium. City of ancient Umbria, Italy, on the Flaminian Way. It was one of the first towns occupied by Julius Caesar after he had crossed the Rubicon. The modern Gubbio, it is famous for the seven bronze tablets discovered by a peasant in a ruined temple of Jupiter Apenninus, containing an important contribution to a knowledge of the Umbrian language. See Engubine Tables; Gubbio.

I.H.S. Monogram used in Christian worship from early times. Placed within a circle of



I.H.S., the Christian monogram

rays, it is a device of the Society of Jesus. Probably it represents the first three letters of the Greek IHCOYC (Jesus), with the third letter Latinised. Variant forms are IC, IH, IHC, JHS. Alternatively, it is explained as the initials of the Latin words, *Jesus Hominum Salvator*, Jesus

the Saviour of Men, or *In Hoc Signo (vinces)*, In this sign (thou shalt conquer), said to have been seen by the Roman Emperor Constantine on the radiant cross that appeared to him in the sky on the occasion of his setting out to fight Maxentius. Other interpretations are: I Have Suffered; Jesus, Heavenly Saviour. A German rendering is *Jesus, Heiland, Seligmacher* (Jesus, Saviour, Sanctifier). An early example of the form IHC is on a gold coin of Basilius I, in the 9th century.

Ijmuiden. Alternative spelling of the name of the Dutch town described under the heading Ymuiden.

Ijsselmeer. Alternative spelling of Yssel Meer (*q.v.*), a lake of the Netherlands.

Iki. Small island of Japan, off the N.W. coast of Kyushu. It is separated from the Tsushima (Tsu Island) in the strait of Korea by Tsushima Channel, and from the shores of the prov. of Saga on Kyushu by the Iki strait. It is 30 m. N.W. of Fukuoka, and there is good anchorage at Gonoura, the capital, on the S.W. coast. The chief products are grains and beans. The area of the island is 53 sq. m., and pop. 40,200.

II. An administrative unit of Turkey, also called vilayet. See Vilayet.

Ilagan. Municipality of Luzon, Philippine Islands. The capital of Isabela prov., it is 210 m. N.N.E. of Manila, and stands at the confluence of the Abuluan and Cagayan. Its chief industry is the cultivation of tobacco; maize is an important crop. Pop. 31,500.

Iława. Polish name of a town of Olsztyn (Masuria), formerly East Prussia, called in German Deutsch Eylau. See under Eylau.

Ilchester. Village and parish of Somerset, England. It stands on the Ivel or Yeo river and on the Fosse Way, 5 m. N.N.W. of Yeovil. The chief building is the 13th century church of S. Mary Major. There are a market cross, remains of the county jail, and early earthworks. Ilchester was an inhabited place in pre-Roman times. Many Roman antiquities have been dug up. A royal mint was established here in Edgar's reign (959-975). In 1086 Ilchester was a royal borough with 107 burgesses; it withstood a siege by William of Mowbray in 1088. It had a king's jail from before 1166 to 1843. Henry II granted a charter which gave it the same liberties as Winchester. There were a Dominican friary, an

Augustinian nunnery, and a lepers' hospital here.

Until the 19th century Ilchester was the centre of the co. administration. From 1298 to 1832, with occasional breaks, it returned two M.P.s, among them Sheridan and Selden. The endowment of an almshouse founded in 1426 is used today for the relief of the poor. Ilchester was the birthplace of Roger Bacon and Elizabeth Rowe, the poet. Pop. approx. 700.

Ilchester, EARL OF. Title borne since 1756 by the family of Fox-Strangways. In 1741 Stephen Fox (1704-76), a Dorset M.P., was made Baron Ilchester, and in 1756 was created an earl, Ilchester being the name of his Somerset estate. He was a son of Sir Stephen Fox (1627-1716) and brother of Lord Holland, and he took the additional name of Strangways. The earl's eldest son is called Lord Stavordale. Giles, 6th earl, was born May 31, 1874, and succeeded to the title in 1905.

Île de France. French luxury-liner. Of 45,540 tons, she made her maiden voyage in June, 1927. Fifth largest ship afloat, she resumed transatlantic service in July, 1949, after partial reconstruction following service as a troopship in the Second Great War. After June, 1940, when she was at Singapore, she carried some 485,000 Allied troops.

Île de France. Name given to a district in old France, the nucleus of the kingdom. It lay around Paris, and was an island in the sense that its boundaries were mainly rivers. From their home in the island the early kings enlarged their territory, until the old significance of the name was lost. Later, and until the Revolution, the Île was one of the country's provinces. Larger than the original island, it lay between Normandy, Picardy, Champagne, and Orléanais. It is now covered by the departments of Seine, Seine-et-Oise, Seine-et-Marne, Oise, and Aisne.

Île de France. Old name of Mauritius. Discovered by the Portuguese navigator Pedro Mascarenhas, in 1505, it was settled by the Dutch, who renamed the island in 1598. But it was afterwards colonised and held by the French from 1715 until its capture by the British in 1810. See Mauritius.

Iletskaia Zashchita OR ILETSK. Older names of Sol'-Iletsk (*q.v.*), a town of the R.S.F.S.R., in Chkalov region.

Ileum (Lat. *ilia*, groin). Lower three-fifths of the small intestine, about 14 ft. in length. It is a con-

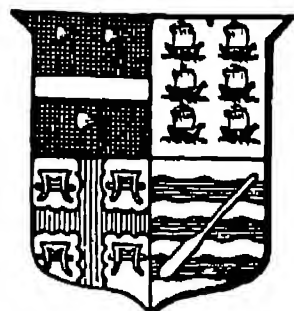
tinuation of the jejunum, and terminates in the caecum or commencement of the large intestine.

Ilex. Genus of about 145 species of shrubs and trees of the family Aquifoliaceae. Natives of temperate and tropical regions, they have alternate, undivided leaves, often of a leathery or evergreen character, and small flowers clustered in the axils of the leaves. The common holly (*q.v.*) is the best known species in the old world, but in S. America the most important is *Ilex paraguayensis*, which yields maté (*q.v.*). The word is often applied to the evergreen oak (*Quercus*) *ilex*, the original ilex of Virgil and the Romans.

Ilford. Borough of Essex, England. It lies E. of the Roding, $7\frac{1}{2}$ m. by electrified rly. E. of the Liverpool Street terminus, and has various London Transport services. A site, nearly 1,000 acres, intended for an airport, was purchased by the bor. council as an open space. The district includes Aldborough Hatch, Barkingside, Goodmayes, Newbury Park, Seven Kings, Chadwell Heath, and part of the L.C.C. Becontree and Hainault estates. There are parks and recreation grounds; Hainault Forest lies within easy reach.

Since 1939 the town has developed industrially but without encroachment on residential areas. Paper, photographic material, electric lamps, radio components, and precision instruments are made. Ilford forms two borough constituencies. There are a modern hospital, isolation hospital, maternity home, and clinics and nurseries. Among the churches, S. Mary's dates from 1830, others being newer. Of 46,631 houses, over 45,000 were damaged by enemy action in the Second Great War. The pop. in 1876 was 3,689; at the census of 1951 it was 184,707.

Ilfracombe. Seaport, market town, and urban district of Devon, England. On the S. shore of the Bristol Channel, 12 m. N.N.W. of Barnstaple, it is $226\frac{1}{2}$ m. by rly. from London (Waterloo). Its harbour offers safe anchorage to small craft.



Ilfracombe arms

and from the pier sail pleasure steamers to Lundy, Bristol, and S. Wales. As a seaport it was more significant in bygone days; in 1346 it furnished six ships and 96 men



Ilfracombe, Devon. Capstone Hill from the west. Top right, the town and harbour from Hillsborough

for the siege of Calais. The antiquarian now must turn to the old parish church of Holy Trinity, or to the lighthouse on Lantern Hill, once the chapel of S. Nicholas. During the 19th century Ilfracombe became recognized as a health resort; and its increasing popularity can be attributed also to a district of magnificent scenery. The rugged coast offers bathing coves; within easy reach lie Exmoor and Dartmoor. Market days, Wed. and Sat. Pop. (1951) 9,218.

Ilhavo. Harbour of Portugal, in the dist. of Aveiro. It stands on a lagoon, 3 m. S.W. of Aveiro. A fishing port, it exports much salt, but it is chiefly noted for glass and porcelain ware. Traditionally founded by the Greeks, Ilhavo is renowned for the beauty of its women. Pop. (1950) 21,513.

Itheos. Seaport of Brazil, 120 m. S. of the city of Bahia, and in that province. It handles two-thirds of the cacao crop of Brazil and has direct steamer communication with the U.S.A. Pop. of port and district, approx. 50,000.

Ili. River of Central Asia, partly in Sinkiang, China, and partly in the Kazakh S.S.R. It rises in the Tian-Shan Mts., and as the Tekes flows N.E. till it is joined by the Kungez and Khashi, and becomes the Ili. Bending sharply W., it crosses the Russo-Chinese frontier, and at Ilisk turns N.W., to fall into Lake Balkhash. Length, 950 m.

Ilia. Nome of Greece. See Elis.

Ilia. In Roman legend, another name for Rhea Silvia. She was the vestal virgin who became by Mars the mother of Romulus and Remus. See Rhea Silvia.



Iliad, THE. Greek epic poem ascribed to Homer. In 24 books, it deals with a phase of the tenth year of the Greeks' siege of Ilion or Troy. The central incident is the wrath of the hero Achilles. Agamemnon, the leader of the besieging Achaean host, has seized the Trojan maiden Chryseis, the daughter of a priest of Apollo. The god thereupon has sent a plague, which the soothsayer Calchas declares can be stayed only by the restoration of Chryseis to her father. Agamemnon consents, but by way of compensation threatens to deprive Achilles of the captive maid Briseis. Achilles thereupon retires to his tent.

At the entreaty of Thetis, mother of Achilles, Zeus inclines the scales of victory in favour of the Trojans until Hector has stormed the ramparts and Agamemnon promises atonement. Even then Achilles refuses to take an active part in the struggle, but allows his friend Patroclus, equipped in his armour, to take his place. Patroclus is slain by Hector, whereupon Achilles leaves his tent and avenges the death of his friend. The poem concludes with the funeral games in honour of Patroclus and the ransoming of the body of Hector by his father Priam. See Achilles; Homer.

Iliamna. Lake and volcano of Alaska, U.S.A. The lake, largest in Alaska, is 75 m. long and up to 25 m. wide, lies across the head of the Alaska Peninsula, and empties its waters into Bristol Bay via the Kwichpak river. It abounds in trout. The volcano, situated near the shore to the W. of Cook Inlet, and reaching an elevation of 10,085 feet, is occasionally active.

Iliffe, EDWARD MAUGER ILIFFE, 1ST BARON (b. 1877). British newspaper proprietor. The son of William Iliffe, J.P., Allesley, Warwickshire, he was born May 17, 1877. He founded a publishing house with The Cyclist, in 1881. This journal and a later venture, The Bicycling News, which had the distinction in 1888 of employing on its staff Alfred Harmsworth, afterwards Lord Northcliffe, may be regarded as the pioneers of the

many periodicals which have since come into being with the expansion of first the cycling and later the motoring industry.

In due course Edward Iliffe, together with his brother, W. Coker Iliffe, entered the paternal business. The



Lord Iliffe,
British newspaper
proprietor

foresight of William Iliffe and the energy and enterprise of his sons, in building up and maintaining a body of journalism unique in the world and in every way worthy of the British industries with which it was connected, were responsible for the great success of the well-known group of high-class technical journals which are now associated with the name of Iliffe. The firm also established in 1891 the Midland Daily Telegraph (later the Coventry Evening Telegraph), whose successful career is a reflection of the rapid growth of the Coventry industries.

After the death of their father the control of the business passed into the hands of his two sons in 1917. Under their able direction the publishing house of Iliffe & Sons, of London and Coventry, expanded steadily. Modern methods and acute anticipation of modern needs ensured its success, and in its London offices at Dorset House, Stamford St., S.E.1, it possesses one of the finest newspaper buildings in the metropolis.

Not content with the continuous and increasing success of the numerous technical journals under his control, Edward Iliffe entered into association with William and Gomer Berry (later Lord Camrose and Lord Kemsley) in various large newspaper enterprises, and eventually became with them a joint proprietor of the Daily Telegraph, a director of Allied (now Kemsley) Newspapers, Ltd., an organization which controls no fewer than 23 national, provincial, and Scottish newspapers; a director of the Amalgamated Press, Ltd., originally founded by Northcliffe; and of various other publishing enterprises. Most of these interests were eventually relinquished as the result of new dispositions at the instance of Lord Camrose, which are more fully explained under the entry Camrose. But in friendly separation from these important journalistic ties, Iliffe had other schemes for independent action,

and in 1944 he acquired the control of the Birmingham Daily Post, and its associate journals the Weekly Post and Birmingham Daily Mail. To this important provincial group and the Coventry Evening Telegraph his interest in journalism was later confined.

But Iliffe showed himself a man of many interests, particularly in the insurance world, though his chief activities apart from those mentioned long lay quite outside his commercial or professional life. His public services, and particularly his war work under the aegis of the Red Cross, in both Great Wars are too numerous to tabulate. But it may be noted that among the many public positions he filled with distinction are those of president of the Association of British Chambers of Commerce (1932), president of the trustees of the Shakespeare memorial theatre, Stratford-on-Avon, president of the Queen Elizabeth hospital for children, president of the Periodical Proprietors' Association (1935-38), and master of the Worshipful Company of Stationers and Newspaper Makers (1937). For his many public services he was knighted 1922, and received the G.B.E., 1946. In 1923 he was elected Unionist M.P. for Tamworth, and retained the seat until 1929. He was raised to the peerage as Baron Iliffe of Yattenden in 1933. He married in 1902 Charlotte Gilding. His heir, Edward Langton Iliffe, was born in 1908.

J. A. Hammerton

Ilissus. Small river in Attica, Greece. It rises in Mt. Hymettus, flows S. past Athens, and after joining the Cephissus discharges itself into the Bay of Phalerum. In summer its stream is always dry. Ilissus and its surroundings are charmingly described in Plato's dialogue Phaedrus.

Ilithia (Greek *Eileithia*). In Greek mythology, the goddess who assisted women in childbirth. She was the daughter of Hera, with whom, as with Artemis, she was often identified.

Ilium. The classical name for the ancient city in N.W. Asia Minor, which is more usually known under the name Troy (*q.v.*).

Ilk. Old Scottish or English word meaning "same," chiefly used in the phrase "of that ilk" as the territorial designation of Scottish landed families, where the surname and the name of the land are identical, *e.g.* Guthrie of that ilk.

Ilkeston. Mun. borough and market town of Derbyshire, England. It is 9 m. N.E. of Derby and 7 m. N.W. of Nottingham, and is served by two railway lines. The river Erewash, a county boundary, runs by it, as does a canal. The chief building is the fine old church of S. Mary, partly Norman. Ilkeston is mentioned in Domesday, but was a small place until the 19th century, when the development of the coalfield made it a manufacturing centre. It has ironworks and makes hosiery and lace. Made a mun. bor. 1887, Ilkeston gives its

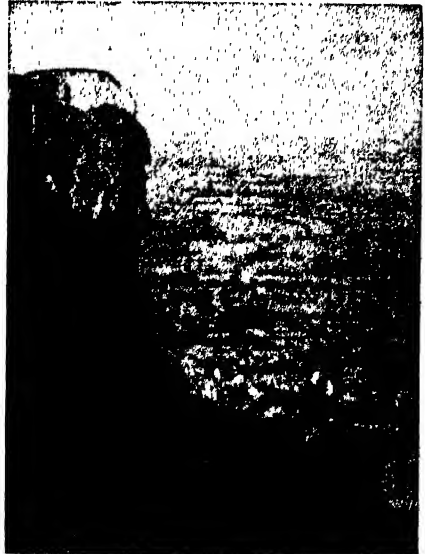
name to a co. constituency. Pop. (1951) 33,674.

Ilkley. Urb. dist., spa, and inland holiday resort of the West Riding of Yorkshire, England, on the river Wharfe, 12 m. N.N.W. of



Ilkley arms

Bradford. In the churchyard of the parish church, All Saints, are three Saxon crosses; the old packhorse bridge over the Wharfe, Hebers Ghyll, White Wells, the Swastika



Ilkley. The Cow Rock, one of the great crags high on the moors S.E. of Ilkley, seen in the background

Stone, and the Cow and Calf rocks are other interesting features of the town. There is a grammar school (founded 1607), public offices, including the King's Hall with seating for 600 persons, and the winter gardens, and hydro-pathic establishments. The council owns Ilkley Moor, 2,000 acres of moorland. Ilkley was a Roman settlement (Olicana); its museum houses relics of Ilkley's history including flint implements of Mesolithic age; Roman coins, pottery, etc.; medieval glass and stone carvings, and implements used in the early days of the woollen industry. Pop. (1951) 17,284.

Illahun OR EL LAHUN. Village in the Fayum, Upper Egypt, 12 m. S.E. of Medinet-el-Fayum. In the vicinity is the mud-brick pyramid, once limestone-cased, of Senusert II. The village which had housed the pyramid workers has also been excavated. A Coptic cemetery of about A.D. 600 yielded embroideries and woven stuffs, the finest of which were placed in the Victoria and Albert Museum, London.

Ilampu OR SORATA. Peak of Bolivia. In the Eastern Cordillera, it is in the dept. of La Paz, 60 m. N.N.W. of La Paz, and E. of Lake Titicaca. Height, 21,500 ft.

Illawarra. A district of New South Wales, Australia. It comprises the coastal strip between the mountains S. of Sydney and the Pacific, and is noted for its scenery. Rich in steam coal, it is an industrial centre making iron and steel goods. A productive dairying district, it supplies Sydney with milk, by a coast rly. which has its terminus on the S. shore of Illawarra Lake, a noted arm of the sea. Pop. 68,150.

Illecebraceae. A family of small tufted annual and perennial herbs. They are natives of warm, dry regions. They have alternate, or opposite, undivided leaves and flowers in small clusters. There are four or five sepals, which persist and cover the fruit, and the petals are either very small or entirely lacking. The fruit is a bladder, enclosing a single seed.

Ille-et-Vilaine. Department of France, forming part of Brittany. It stretches along the English Channel, Dinard, St. Malo, and other pleasure resorts being herein, while off its coast is Mont St. Michel. The dept., whose area is 2,679 sq. m., is fairly level. Its chief rivers, in addition to those from which it receives its name, are the Seiche, Meu, and Rance. There are a number of small lakes. It is an agricultural region. Some

of the inhabitants are engaged in fishing, some in mining. Rennes is the capital. Pop. 578,246.

Illegitimacy (Lat. *illegitimus*, not in accordance with law). Condition of one born out of matrimony, i.e. bastardy. By English law a child is illegitimate if its mother is unmarried at the time of its birth or if she is a married woman but the child is not the child of her husband and has been repudiated by him. The child of a widow, or of a woman whose marriage has been dissolved by divorce, which is born so long after the husband's death, or the divorce, that he could not be its father is also illegitimate. When a voidable marriage is declared null any children born of the marriage are legitimate.

The maintenance of an illegitimate child is the legal obligation of the mother. If she is a single woman, or a married woman living separate from her husband, she may obtain an order from a court of petty sessions against the father for payment of a weekly sum (in 1952 not exceeding 30s.) until the child attains any age specified by the court up to sixteen, or dies; if the child is being educated or trained full-time, payment may continue until he or she is 21.

She must apply either (i) before the child is born or (ii) within twelve months after the birth; (iii) at any later time if she can show that the father paid money for the child's maintenance within 12 months after the birth; or (iv), where the father left England within 12 months of the birth, then within 12 months of his return. A mother who has gone through a form of marriage but whose marriage is invalid because she was under 16 at the time of the ceremony may apply at any time. The order ceases to have effect on the making of an adoption order, unless the mother is the adopter; it then ends on her marriage. The application for the order may be made by a local authority where the child is in its care or in an approved school managed by it or to which it contributes, or by the national assistance board where assistance is given to the child by the board.

Illegitimate persons are subject to legal disabilities in the law of succession. An illegitimate person can always succeed to the property of his wife or descendants on their death intestate to the same extent as if he were legitimate, and they can similarly succeed him. As regards succession on intestacy,

however (unless he has been adopted or legitimated), he has in law, with one exception, no ancestors or collateral relations. He cannot succeed to any of these relations nor can they succeed to him. The one exception is that he can succeed to his mother if she dies intestate without legitimate issue; and if he dies without legitimate issue she can succeed to him, subject to any claims a surviving spouse may have on the illegitimate's property. (For the position of an adopted person, see Adoption.)

By the Legitimacy Act, 1926, illegitimate children may in some circumstances be made legitimate by the subsequent marriage of the parents. See Legitimacy.

Iller. River of Bavaria, Germany. Rising in the Alps in Tirol, it flows mainly N. until it falls into the Danube near Ulm. It forms for some distance the boundary between Württemberg and Bavaria. Its length is about 100 m.

Illimani. Volcanic mountain mass of the Andes. It is in Bolivia, about 26 m. S.E. of La Paz. One of the loftiest summits in the republic, with four main peaks, it is perpetually snow-covered above 15,000 ft. It carries glaciers and a lake at an alt. of nearly 16,000 ft. One of the minor peaks was first ascended in 1877, and the highest was scaled by Sir Martin Conway in 1898. Its alt. is 21,000 ft.

Illingworth, ALBERT HOLDEN ILLINGWORTH, BARON (1865-1942). British politician. Born May 25, 1865, he was educated at the London International College, and made an outstandingly successful business career in Bradford. He entered parliament as Liberal M.P. for Heywood, 1915-18, and represented Heywood and Radcliffe, 1918-21. Postmaster-general in the Coalition ministries from 1916, he resigned on becoming a baron in 1921. He died Jan. 23, 1942.

Illinium. Former name of element 61 subsequently renamed promethium (*q.v.*).

Illinois. River of the U.S.A. Formed by the union of the Kankakee and Des Plaines rivers in the N.E. of Illinois state, it flows W. and then abruptly S. to the Mississippi about 20 m. above the latter's confluence with the Missouri. About 273 m. long, it is part of the Illinois Waterway, a 327-mile cross-state system of canals and natural waterways connecting Lake Michigan and the Mississippi. Tributaries include the Sangamon, Vermilion, Fox,

and Spoon. The drainage basin is about 24,726 sq. m.

Illinois. North-central state of the U.S.A., the 23rd in size. It lies to the S.W. of Lake Michigan, which forms part of its eastern boundary. The area of 56,400 sq. m. is almost surrounded by water, nearly three-quarters of its boundaries being navigable rivers. The largest rivers are the Mississippi, extending along the western boundary, its tributary the Illinois, which flows wholly within the state, draining 24,726 sq. m., and the Wabash and the Ohio, on the E. and S. borders respectively. Altogether, Illinois has 1,180 miles of navigable rivers supplemented and coordinated by the Illinois Waterway. This 327-m. canal system, extending from Chicago to Grafton, links Lake Michigan with the Mississippi and includes the Chicago river, the Chicago Ship Canal, and parts of the Des Plaines and Illinois rivers. The state is virtually level throughout and experiences extremes of temperature.

Illinois is extremely fertile and ranks as the fourth richest agricultural state. Principal crops are wheat, oats, barley, rye, potatoes, hay; fruit, nuts, and wood are also produced. With Chicago leading the world in slaughtering and meat-packing, Illinois has long ranked first in this industry. It is the fifth largest producer of minerals in the U.S.A., coal deposits underlying half the state; there are also found iron, oil, natural gas, lead, zinc, stone, gravel, and cement. Secondary industries are steel and iron products, railway and motor vehicle works, oil refineries, printing and publishing, the manufacture of agricultural and electrical machinery, men's clothing, and wood and leather goods.

Thirty-three major trunk lines enter Chicago, which is the largest rly. terminus in the world, and the state has 11,758 m. of track. In 1951 there were 158 airports, 42 of them publicly owned.

The capital is Springfield, but Chicago is the largest city; 70 other towns had more than 10,000 inhabitants in 1950, 70 p.c. of the pop. being urban. Higher education is provided by the universities of Illinois (at Urbana), Chicago, Loyola, and Evanston, and there are several state teachers' and other colleges. Illinois originally formed part of Indiana Territory, at one time part of Canada. An organized territory by 1809, it was admitted to the union in 1818.

Two senators and 25 representatives are returned to congress. Illinois was long traditionally Democratic in the large cities, Republican in rural areas. Pop. (1950) 8,712,176, making it the fourth state in size of pop. *Pron.* Illinoy or Illinoyz.

Illuminati (Lat., enlightened). Name applied to several sects and schools of thought. The first arose in Spain in the 16th century, through the teaching of a Carmelite nun. Its members rejected the Sacraments, holding that spiritual perfection could be attained by meditation, that good works were unnecessary, and that they were incapable of sinning. The sect was cruelly suppressed by the Inquisition. In 1634 another sect, called Guérinets from their leader Pierre Guérin, arose in Picardy. He taught a kind of perfectionism which virtually amounted to the deification of its followers, and naturally led to antinomianism. The movement was suppressed by Louis XIII. In 1776 the name was assumed by a party of atheists at Ingolstadt, under the leadership of Adam Weishaupt (1748-1830), a professor in the university. They sought to introduce free-thinking republicanism under the guise of toleration and social reform, and organized a sort of freemasonry with this object. They were suppressed by the Bavarian government in 1785.

Illumination. A term in physics which might be defined as the amount of light falling on a surface. The idea of an "amount of light," however, presents difficulties, since the eye can make only very poor quantitative judgements. Moreover, its impression of more or less light does not correspond to physical measurements of the amount of energy present in any given radiation. But the eye can tell with fair consistency when two adjacent similar surfaces seem to it equally lit, and on this form of judgement all measurements of light are ultimately based.

A unit of luminous intensity was first defined by the (London) Metropolis Gas Act of 1860 as the intensity (in a horizontal direction) of a "standard candle" of spermaceti weighing $\frac{1}{2}$ lb. and burning 120 grains per hour. In 1909 an "international candle" was agreed, and defined by reference to specially constructed electric lamps deposited in the various national laboratories. In 1946 a new primary standard was defined in the form of a small tube

of thoria immersed in molten platinum in process of solidification, and hence at 1773.2° C. The luminous intensity at the mouth of the tube was found to be 58.59 int. candles. A "new candle" or candela was therefore agreed such that the intensity of the standard source would be 60 candelas per sq. cm. The candle-power of a source is found by noting the distance at which it produces the same illumination as a standard source at a known distance and applying the square law (*see* Photometry).

Luminous flux is defined as the rate of flow of radiant energy reckoned according to its power to produce the sensation of light. The unit is the lumen, equal to the rate of flow of luminous energy from a uniform point source of one candle within unit solid angle; i.e. if the source is at the centre of an imaginary sphere of unit radius, one lumen of luminous flux will flow continuously through each square unit of the surface of the sphere, and the source (1 candle) will emit 4π lumen.

Illumination is the amount of luminous flux falling on unit area of a given surface. The units are: the metre-candle or lux, equal to one lumen per sq. metre, i.e. the illumination of a (spherical) surface one metre distant from a uniform point source of one candle; the phot, equal to one lumen per sq. cm.; and the foot-candle, equal to one lumen per sq. ft., or 10.76 lux.

An illuminated surface (*e.g.* a sheet of paper) gives off light by reflection, and in this respect is equivalent to an extended source (*e.g.* a ground glass screen lit from behind). The brightness of a surface is the amount of luminous flux emitted or reflected per unit area, and for a perfectly diffusing surface appears the same from all directions. Units are: the lambert, giving one lumen per sq. cm. (a brightness of one lambert is thus equivalent to an extended source with an intensity of $1/\pi$ candle for every sq. cm. of area); the stilb, equivalent to 1 candle per sq. cm. (so that 1 stilb = π lambert); the apostilb giving one lumen per sq. metre (so that 1 lambert = 10^4 apostilb); and the foot-lambert giving one lumen per sq. ft.

Illumination. Decoration of written text with coloured pictures or designs, chiefly on manuscripts. Painted books were the immediate precursors of printed books. They were works of art, and being portable, could easily be preserved.

Hence extant examples retain pristine vividness of colouring and sharpness of definition. Their vogue lasted from the 9th to the 16th century, though some, *e.g.* the celebrated version of the Gospels produced at Kells, now in Trinity College, Dublin, were written and ornamented some centuries earlier. The illuminators were either professional artists or scholarly monks who had made a special study of miniature painting and decoration.

The Western countries of Europe furnished brilliant specimens, each nation having its own characteristics. The MSS. most commonly illuminated were Bibles, Gospels, Psalters, Missals, Breviaries, Books of Hours, and manuals of devotion, and, less generally, Bestiaries, certain of the Latin and Italian classics, and works of a religious and theological character. The most famous of the English schools included Winchester, Hereford, Salisbury, Durham, Canterbury, York, E. Anglia, and other monastic centres. William Morris wrote some MSS. of remarkable beauty. See Bible; Manuscripts; Writing.

Illusion (Lat. *illudere*, to trick, cheat). Erroneous interpretation of something really existent and actually perceived by the senses. It is distinguished from hallucination in which a person subjectively perceives what has no real existence so far as his sense perceptions are concerned. Some illusions arise from imperfect knowledge or perception, as when a person is deceived by the tricks of a conjurer. Others arise from a disordered condition of the senses, as when an intoxicated man sees two objects where one exists.

Illustrated London News, THE. Oldest pictorial newspaper in the world. A weekly, it first appeared May 14, 1842, containing 16 pp. with 32 woodcuts, price sixpence, and, until The Graphic was founded in 1869, was without a serious rival. Its founder, Herbert Ingram (*q.v.*), Nottingham printer and bookseller, aimed at making the news interesting in the home. By 1851, when an edition was printed in the Great Exhibition, it had a circulation of 130,000. In 1855 its Christmas number was for the first time printed in colours, and in 1861 photography was used for preparation of a wood engraving. The paper was the pioneer in Great Britain of photogravure printing for newspapers and made a feature of war pictures by well-known artist-correspondents.

Dr. Charles Mackay, editor 1848–59, was succeeded by J. L. Latey, Clement Shorter, and Bruce Ingram. James Payn, G. A. Sala, and G. K. Chesterton were prominent contributors. Arthur Bryant succeeded the last as contributor of the feature Our Note Book. After the Second Great War, a building at 195–198 Strand, W.C.2, on the site of the original premises of the I.L.N., was bought to house the paper.

Illustration (Lat. *illustrare*, to make clear). Term employed with two principal connotations. (1) In rhetoric, an example, simile, or allegorical figure employed to give additional clearness to the statement of a moral truth. (2) In art, the pictorial elucidation of the printed word by diagrams, and more specifically its ornamentation by explanatory, interpretative, or complementary drawings or photographs.

The embellishment of manuscripts with designs and pictures wrought by hand belongs properly to the art of illuminating (*q.v.*). The history of book illustration is coterminous with the history of printing. Books containing illustrations, engraved on copper and wood, have existed from the 15th century. But for practical purposes the art may be divided into three periods: (1) the copper and steel plate period, middle of the 18th to the middle of the 19th century; (2) the woodcut period, the whole of the 19th century; and (3) the "process" period—half-tone and line or facsimile—which, beginning towards the end of the 19th century, became peculiarly the product of the 20th.

Steel plates were costliest; woodcuts, though also costly, were the most convenient and most adaptable; process blocks were by far the cheapest, though to obtain the best results from half-tones they must be printed on heavy glazed art paper, which adds very appreciably to the weight of the volume and the durability of which remains to be proved. Steel plates were printed on thick plate paper, and their elegance and finish rendered them exceedingly attractive. They were the special features of various literary Annuals such as Forget-Me-Not (1822–44), Keepsake (1827–56), and the Book of Beauty (1833–53). The most sumptuous book ever adorned by steel plates was the edition of Samuel Rogers's Italy (1830), which contained exquisite illustrations after J. M. W. Turner, and is said to have cost £10,000 to produce.

The growing popularity of woodcuts at length gave the steel plate its deathblow. Apart from their greater cheapness, wood engravings had a double advantage. They could be printed with the letterpress as an integral part of the book on ordinary paper without detriment to their appearance, and by taking one or more electrotypes of them and printing from these, the original woodblock was preserved unimpaired, and with care lasted for an indefinite period.

The publication of illustrated periodicals, such as Punch, The Illustrated London News, and The Graphic, of pictorial Bibles, histories of England, Shakespeares, and other classics, would have been impossible but for woodcuts. The demand for them was so great and regular that many distinguished artists may almost be said to have made their début as draughtsmen on the wood.

Effects of Process Engraving

Woodcuts were eliminated by process engraving, the cheapness of which offered publishers an irresistible temptation. When ten process blocks could be got for one engraved on wood, book illustration was revolutionised. The market was flooded with pictorial "albums" of every description, and when these had had their day, weekly periodicals of all sorts and sizes multiplied indefinitely, and in time the illustrated daily appeared. In wiping out the woodcut, process destroyed a fine art, and in utilising the camera it played havoc with the black and white artists. Still, there must always be a considerable demand for original drawings, and since process reproduces the draughtsman's design with mechanical precision, it possesses, to that extent, an undeniable advantage. This is particularly true of the line process, which presents no difficulties to the printer, whereas the half-tones must be "made ready" with exceptional care, and printed on specially made paper. See Drawing; Engraving; Half-tone; Manuscripts; Photo-Engraving; Photogravure; Woodcut.

Illyria OR ILLYRICUM. Term used in ancient times to designate broadly the country on the Adriatic coast N. of Epirus, extending as far as the river Dravus (Drave), and bounded E. by Macedonia and Upper Moesia. It included roughly what are now parts of Yugoslavia—Montenegro, Bosnia, Herzegovina, Dalmatia—and S.W. Hungary. The Illyrians were a hardy, warlike people, apparently racially akin to the Scythians. They were

conquered by Philip of Macedon in 359 B.C., but after Alexander's death in 323 they threw off the Macedonian yoke. Under their queen, Tueta, their piratical depredations brought them into conflict with the Romans, and in 229 they were defeated, and compelled to cede territory and pay an annual tribute. A rising, in which the Illyrians were led by their king Gentius, ended in the annexation of the country by the Romans in 168. There was sporadic fighting, however, until A.D. 9, when the country was finally conquered by Tiberius and the Roman province of Illyricum was established.

Under the empire the country was a great recruiting ground for the legions, and the emperors Claudius II, Aurelian, Diocletian, and Maximian were Illyrians of humble birth who reached the purple through military command. In 476 Illyricum became part of the Eastern empire. In the 7th century the country was occupied by Slavonic invaders, and the name Illyria or Illyricum disappears from history until in 1816 the Austrians created the kingdom of Illyria, including among other territories Carinthia, Carniola, and Istria. Until 1849 this was one of the states of the Austrian empire.

Shakespeare used the name Illyria for the mythical country in which the action of Twelfth Night takes place.

Ilmen. Lake of N.W. Russia, in the region of Leningrad. Its area is 350 sq. m., length 30 m., greatest breadth 24 m. It is fed by various rivers, notably the Lovat, which flows into it from the S.; and its waters are discharged N. by the Volkhov into Lake Ladoga. Between the two communication points of Novgorod to the N. and Staraya Russa to the S., the lake was in the centre of fighting during the Second Great War. From Sept., 1941, until Jan., 1943, the lake—by water in summer, over the ice in winter—was the only link between beleaguered Leningrad and the rest of the Soviet Union.

Ilmenau. German town and spa, in Thuringia, 30 m. S. of Erfurt, at a height of 2,000–2,500 ft., called after its small river Ilm. Formerly a summer residence of the Weimar dukes, it is famous as one of Goethe's haunts. It was a town by 1341, and has a fine 17th cent. palace, church, and town hall. In its industrial suburb there were china, glass, thermometer, toy and dye factories. Pop. 13,820.

Ilmenite. An accessory mineral in rocks, especially common in association with the more basic igneous rocks, often as large masses. It occurs as black to brownish-black tabular crystals (hexagonal-rhombohedral), grains, or masses. Chemically it is iron, magnesium, and manganese titanium oxide (Fe,Mg,Mn) TiO₃. Ilmenite proper is iron-rich grading into geikelite, which contains much magnesium; pyrophanite is a manganese-rich variety. Ilmenite is one of the ore minerals of titanium, and much of the world's supply is derived from alluvial sands. Sources are India (68 p.c.) Norway (25 p.c.), Malaya, Canada, Senegal, and the U.S.A.

Ilminster. Urban district and market town of Somerset, England. It stands on the river Ille, with a



Ilminster, Somerset. The parish church of St. Mary, a fine example of Perpendicular architecture

ry. station 5 m. N.E. of Chard. It has a grammar school and a fine church in which are buried Nicholas and Dorothy Wadham, the founders of Wadham College, Oxford. Shirts and collars, reconstituted stone, and dairy products are made. Pop. (1951) 2,609.

Ilocos Norte. Prov. in the N.W. of Luzón, Philippine Islands. Bordering the China Sea, it covers an area of 1,265 sq. m. It consists of the W. slopes of the N. section of the Caraballos Occidentales, and is watered by numerous mountain torrents. The province grows cotton, sugar, maize, and tobacco, and has numerous paddy-fields. Cattle, horses, goats, and pigs are reared, and fishing is carried on. Copper, iron, and manganese deposits are worked. Laoag is the capital. Pop. 222,000.

Ilocos Sur. Province in the N.W. of Luzón, Philippine Islands. Covering 492 sq. m., it is a long, narrow coastal plain watered by numerous streams. The Abra enters the sea near Vigan, the capital, and its lower course is navigable. Cotton, paddy, sugar

cane, maize, and peanuts are the chief crops. Cattle, sheep, and goat rearing are important occupations. Pipes, hats, and baskets are made. There are copper mining and lumbering interests. Pop. 219,000.

Iloilo. Prov. of Panay, Philippine Islands. It consists of the S. part of the island and about 60 islands, and covers an area of 2,102 sq. m. Many streams drain from the pine-forested mountains which form the N. and W. boundaries; some are navigable by native craft. Products are rice, sugar cane, maize, coffee, hemp, and tobacco. There are gold and iron mines and quarries. Iloilo is the capital. Pop. 510,000.

Iloilo. City on the S.E. coast of Panay, Philippine Islands. It is the capital of the prov. of Iloilo, and is a terminus of the Panay rly. and has an airport. It has a good harbour, exports sugar, rice, tobacco, dyewoods, and hardwoods, and manufactures lime, jusi, vinegar, hats, machinery. Pop. (est.) 112,000.

Ilorin or ILORIN. Region in the Northern province of Nigeria.

Bounded N. by the Niger, S. by Ondo and Benin, and W. by Oyo and Kontagora, it is divided into the two main districts of Ilorin and Kabba. The country forms part of the basin of the Niger, here defined by the crest of a lofty plateau sloping gradually towards the Niger, and S. to the sea. The N. part of Kabba is more rugged.

The country is rich in agricultural products. It contains the two minor emirates of Shonga and Lafagi, and the semi-independent towns of Awton, Ajassa, Offa, and Patiji; the N.W. portion is traversed by the Iddo-Kano rly. In 1825 Ilorin fell under Sokoto influence, and in 1897 was occupied by the Royal Niger Company. Pop. (mainly Yorubas) 360,000.

Ilorin or ILORIN. Town of N. Nigeria. Situated at a height of 919 ft. above sea level, on the Iddo-Kano rly., 243 m. N.N.E. of Lagos and 541 m. S.W. of Kano, it is a walled town and a great trading centre, with manufactures of leather, pottery, shoes, and cotton. The King's Market of Ilorin is famous. The chief building

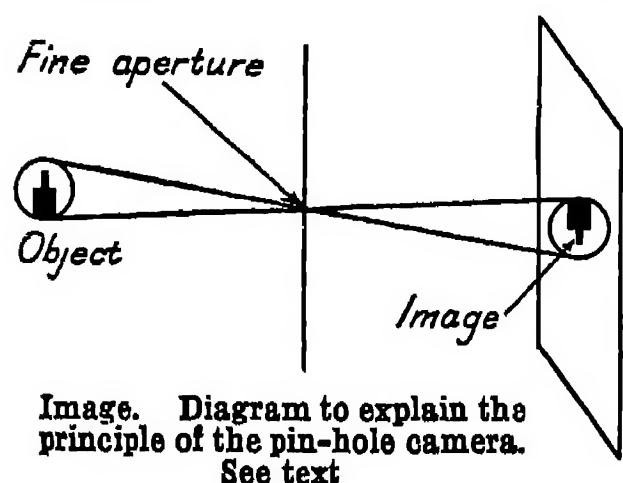
is the palace of the ruler. Ilorin was founded at the close of the 18th century, and became the capital of one of the Yoruba kingdoms. Pop. 54,684.

Il Penseroso. Lyric poem to melancholy, by John Milton (*q.v.*). It was written, as was its companion poem, *L'Allegro*, in the early days of the poet's residence at Horton, 1632-38.

Ilus. In Greek mythology, the legendary founder of Ilium or Troy. He was the father of Laomedon and grandfather of Priam.

Ilvaite, **LIEVRITE**, OR **YENITE**. Complex mineral silicate of iron and calcium, occurring in black prismatic orthorhombic crystals, also compact, massive, opaque. Ilvaite is found in magnetite ore bodies, with zinc and copper ores, in contact-metamorphic deposits, and with zeolites. It is named from the Latin for the island of Elba, which was Ilva.

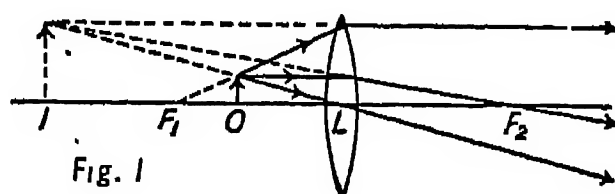
Image (Lat. *imago*, likeness). In optics, the reproduction of an illuminated object. It may arise from rays of light which after proceeding from the object have been (1) reflected from a mirror; (2) refracted from a lens; or (3) passed through a small aperture in a screen. In the last case the image will be in focus, *i.e.* its outline is sharp, wherever the plane surface receiving the image is situated. This is the principle of the pin-hole camera. A wide



angle of view is taken in without distortion of the image, but for a photograph a very long exposure is required.

When mirrors and lenses are employed in image formation, focusing is necessary, *i.e.* for a given position of object there will be only one position of the screen where the image is sharp. This is governed by the type of lens or mirror and the distance of the object from the lens (or mirror) in relation to the focal length. A real image, *i.e.* one which can be received on a screen, is produced only when all rays proceeding from a given point on the object after refraction (or reflection) actually pass through a point

(Fig. 2). A virtual image has no real existence; the rays after refraction (or reflection from a



mirror) apparently intersect only when they are produced backwards; a virtual image cannot be received on a screen but

can be seen by an eye suitably placed on the opposite side of the lens to the object. Fig. 1 shows the formation of a virtual image I by a curved lens when the object O is between the focus F_1 , and the lens L. F_2 is the focal point on the other side of the lens.

Image, **SELWYN** (1849-1930). British artist. Born at Bodiam, Sussex, he was educated at Marlborough, New College, Oxford, and the Oxford Slade School, under Ruskin. Ordained in 1872, he was curate of S. Anne's, Soho, 1876-80, but his bent towards art decided him to follow it professionally. His chief work was the designing of stained-glass windows, characteristic examples of which were the windows for the Prince of Wales's pavilion in the Paris Exposition of 1900; the west window in S. Luke's, Camberwell; and the Four Archangels in Mortehoe church, Devon. During 1910-16 he was Slade professor of fine arts at Oxford. He died Aug. 21, 1930.

Image Worship. Adoration of statues or pictures of sacred persons or things. In the O.T., where idol worship is condemned, are many references to sculptured, graven, and molten images of clay, wood, silver, and gold. In the Christian Church the use of images grew with the development of art. The early Christians, surrounded by representations of pagan gods, doubtless desired to counteract the influence of these with something in keeping with their own faith. Hence the use of emblems, such as that of the dove to represent the Holy Spirit; the Cross; and mystical monograms. As art progressed, statuary and frescoes were introduced, and the veneration of images led to the rise of the Iconoclasts in the 8th-9th centuries. In medieval times sacred images were often associated with miracle working, and their veneration sometimes approached idolatry.

At the Reformation, while Lutherans were comparatively indifferent on the subject so long

as the images themselves were not worshipped, the Calvinists and Puritans rejected them entirely, and in England many priceless and unobjectionable works of art were destroyed by the zeal of the Reformers. The 19th century witnessed a notable revival in the

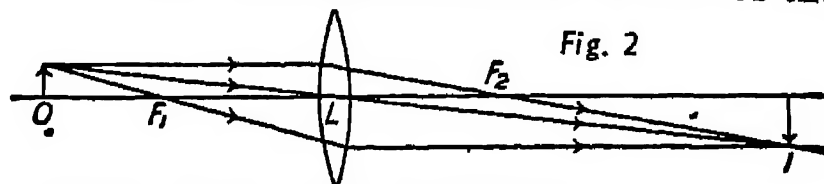


Image. Fig. 1. How a virtual image is formed. Fig. 2. Production of a real image. See text

use of sculpture, stained-glass windows, etc., in places of worship. The R.C. Church forbids absolute, but permits relative, homage to representations of Christ, the Virgin Mary, and the saints. The Greek Church permits the use of the icon and of pictures. Islamism rejects all representations of living things. See Emblem; Golden Calf; Icon; Iconoclast; Idolatry.

Imaginary Conversations. Prose work by W. S. Landor, published 1824-46. It includes classical dialogues, *e.g.* between Diogenes and Plato, dialogues of literary men, sovereigns, statesmen, etc., *e.g.* between Peter the Great and his son Alexis, and dramatic presentations of character. The best edition is that by C. G. Crump, 6 vols., 1891-1901.

Imagination (Lat. *imago*, likeness). Process of mentally combining items of experience so that they form a new entity which may or may not correspond with the real object or event. This power can be exercised voluntarily, as in writing a poem, composing music, painting a picture, evolving a new theory, or enjoying a daydream. It can also occur unintentionally, especially under the influence of any strong emotion such as love or anger or fear. Shakespeare gives an example of this in the line, "How easy is a bush supposed a bear"; in this instance the observer imagines that there is danger because of his feelings of anxiety or guilt.

Imāgo (Lat. likeness). The biological term given to the adult or perfect stage of an insect, after it has completed growth and metamorphosis. Generally, but by no means always possessing wings, the imago has as its main function the propagation of the species. Some insects, including mayflies and certain moths, do not feed in the imago, their mouth-parts being non-functional.

Imām OR **IMAUM** (Aral., leader, president). Mahomedan title with various meanings. It was given



Imam of Persia
reading the Koran

to certain Mahomedan princes in the early period, e.g. the caliphs, and survives in modern times, e.g. the imam of Yemen; to the twelve chief heads of the Shiite or Shiah sect; to the founders of a theological system among the Sunnites, and of the four orthodox Mahomedan sects. In modern usage, the name specially indicates the minister who officiates in the mosques at public prayers; he represents the people, and his office has no sacerdotal character.

Imandra or **INANDRA**. Lake in N.W. Russia, called, in Lappish, *Aver*. It lies across the boundary of the Murmansk region of the R.S.F.S.R. and the Karelo-Finnish S.S.R., on the peninsula of Kola. Its area is 350 sq. m., length 50 m., and average breadth 8 m. It discharges its waters by the Niva into the bay of Kandalaksha, in the W. of the White Sea. It is frozen over most of the year, but is much frequented in summer by Lapp fishermen. The rly. from Kola to Kandalaksha passes its E. shore.

Imari. Japanese ware. It is a mixture of white clay and ground feldspathic rock, forming a fine stoneware, or porcelain. It was first made in the province of Hizen, now Nagasaki, in 1600. The painting is under glaze, the earlier pieces being modelled on Korean and Chinese specimens; the latter are characterised by vitrifiable enamel relieved with gold, but more particularly with handsome paintings of chrysanthemums and peonies in a lilac blue, lustreless red, and matt gold.

Imbabura. A department of Ecuador, bounded W. by Esmeraldas, S. by Pichincha, N.E. by Carchi. Its area is 2,414 sq. m. Amid the Andes, it is mostly mountainous, containing the volcano Imbabura, 15,000 ft. in alt. Well watered by the Verde, Mira, and other streams, it is very fertile, but stock raising is the chief occupation. The capital is Ibarra (*q.v.*). Pop. (est 1955) 157,880.

Imbecility (Lat. *imbecillus*, feeble). Grade of mental deficiency dating from early life, characterised by a lesser degree of social incapacity than is idiocy (*q.v.*).

Imbros or **IMBRO**. Turkish island near the entrance to the Dardanelles. The chief town is Kastron, or Castro, the seat of a Greek bishop. The island produces cereals, fruit, and silk. After the British evacuated Gallipoli, Dec., 1915, they used Imbros, then held by the Greeks, as a military base. It was restored to Turkey and demilitarised, 1924, by the Lausanne agreement. Area, 100 sq. m.

Imhotep (*fl.* c. 2800 B.C.). The earliest known physician, in Greek *Imonthes*. He was chief minister and architect to Zoser, a king of the IIIrd dynasty of Egypt. Zoser's pyramid at Sakkara, the first built in stone, and the beautiful temple adjoining it were thought to have been designed by Imhotep. So great was his reputation for wisdom in magic and medicine that he became a demi-god and was identified by the Greeks with Asklepios. His temple at Philae still stands.

Imitatione Christi, *De* (Concerning the imitation of Christ). Treatise on the religious life by Thomas Hammerken, or Thomas à Kempis. See à Kempis.

Immaculate Conception. Dogma of the R.C. Church declaring that the Blessed Virgin Mary, from the first moment of her conception, was preserved from all stain of original sin, through the foreseen merits of Christ. Mary's sinlessness is referred to in general terms by Justin, Tertullian, and Irenaeus by the 2nd century. By the 6th century it was more explicitly taught by Fathers of both East



Imari. Bowl of this Japanese ware
with painted design

and West. From the 12th century, until its definition as an article of faith, it caused controversy between the Dominicans, most of whom rejected the doctrine, and the Franciscans. The feast of the Immaculate Conception was kept in the East in the 8th century and in England before the Norman Conquest; it was extended to the whole Latin Church in 1476. Defined as an article of faith by Pius IX on Dec. 8, 1854, the doctrine is quoted by R.C. theologians as a classic example of the gradual development of a dogma. See Incarnation.

Immanence (Lat. *in, in; manere*, to remain). Name given to a pantheistic theory of the universe. It means that the intelligent cause of the universe is shut up in the universe itself, and is neither exterior nor superior to it. See Pantheism.

Immanuel or **EMMANUEL** (Heb., God is with us). Hebrew proper name. It was the name or title of a child whose birth Isaiah (7, v. 14) predicted as a sign from heaven that God would preserve Judah from destruction at the hands of its foes. In Matthew (1, v. 23) the prophecy is applied to Christ as the Messiah and Saviour of His people. See Jesus Christ.

Immermann, **KARL LEBERECHE** (1796-1840). A German novelist and dramatist. Born at Magde-



Karl Immermann,
German novelist

burg, April 24, 1796, he fought at Ligny and Waterloo, and in 1817 entered the Prussian public service. He became judge at Magdeburg, 1823, and Düsseldorf, 1827, where he was for two years (1834-36) director of the theatre. He wrote many romantic plays, but was more successful as a novelist; in *Die Epigonen* (The Decadent Descendants), 1836, he contrasted the old social order and the new epoch of the factory and machine; Münchenhausen, 1839, was a satiric romance; *Der Oberhof* (The Upper Court) was his most popular work. He died Aug. 25, 1840.

Immigration (Lat. *in, into; migrare*, to move). Entrance into a land of people from another country for the purpose of settlement. It is thus the complement of emigration, for all immigrants are necessarily emigrants. It may be the movement of persons to another part of an empire, e.g. Gt. Britain to Australia, or it may be their entrance into countries under another rule, i.e. alien immigration.

The peoples of all countries have, at some time or other, been affected by such migrations. In the contemporary world, the outstanding example of a country whose pop. is founded on immigration is the U.S.A. Except for pure-bred American Indians every one of its 150 million people is an immigrant or of immigrant descent. No records, however, of the annual influx from abroad were kept until 1820, in which year the number entering the country was only 8,385. By 1830 it had risen to 23,322. The

total reached a much higher figure during the 1850s, and after the Civil War immigration was greatly accelerated. It was deliberately stimulated by the railroads, which in their eagerness to colonise the Western plains flooded the Old World with tempting advertisements. Their example was followed later by industrialists in search of cheap labour for their mines, mills and factories, as well as by steamship companies seeking an expansion of their traffic. Between 1870 and 1910 more than 20 million Europeans went into America's "melting-pot."

The immigrants responding to this propaganda were of a notably different type from their predecessors, who had been mainly British, Irish, German, and Scandinavian. The lure of the Western "land of promise" was now most potent in Italy and Eastern Europe. The majority of the newcomers crowded into industrial cities, both large and small. A comparatively small group among them made a valuable contribution to American culture in science, education, music and the arts.

By the turn of the century there developed an agitation to put a stop to unrestricted immigration. Attempts by congress to impose a literacy test were vetoed by Presidents Cleveland, Taft and Wilson successively. By a series of laws enacted later, the U.S.A. set a limit, on a quota basis, to the number of annual admissions from foreign countries. There was a drop from 1,218,480 in 1914 to 326,700 in 1915, and again from 241,780 in 1930 to 97,139 in 1931. During the great depression, 1929-33, there were in some years more emigrants from than immigrants into the U.S.A. During the Second Great War immigration went down to 23,725 in 1943. It started upward once more in 1946, with 108,721 entrants. Some particulars of the legislation passed to exclude coolie labour will be found under Coolie.

Immingham. A seaport and parish of Lincolnshire, England. It is 7 m. by railway N.W. of Grimsby. It was a straggling hamlet devoted to agriculture until the 20th century, when the rly. company decided to construct extensive docks here. Begun in 1906, these were opened in 1912 to deal with the coal and other produce of the Midlands, and also with the import of grain and timber. The village has a Perpendicular church dedicated to S. Andrew. Pop. 2,423.

Immoral Agreement. In English law, an agreement unenforceable by reason of its nature. The most common are those by which a man promises to pay an annuity to a mistress. If the consideration for such an agreement is future immoral relationship, then it is unlawful and void. But if, cohabitation having ceased, the man, by deed under seal, promises to pay, his promise can be enforced. When a gift has been given in consideration of immoral relationship, the donor cannot sue for its return.

Immortal Hour, THE. Drama by "Fiona Macleod" (William Sharp) with music by Rutland Boughton. The first London performance was given in 1920, at the Old Vic, when Gwen-Ffrangcon-Davies sang the part of Etain. Notable for the delicacy of its music, as in *The Faery Song*, and for its "fey" Celtic atmosphere, it was produced at the Regent Theatre, 1922. Later revivals included those at the Kingsway Theatre, 1926; and Queen's Theatre, 1932.

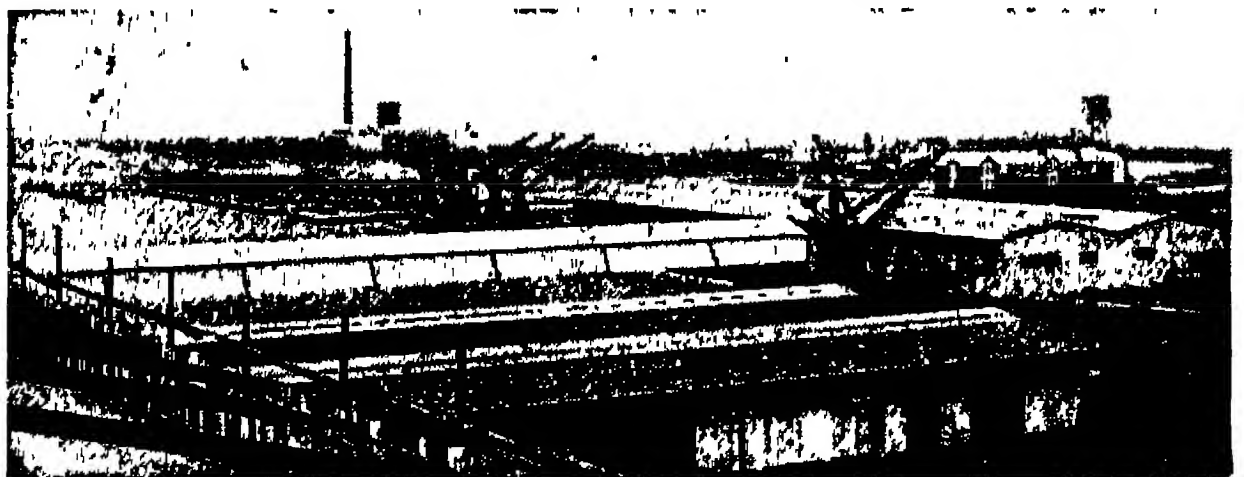
Immortality (Lat. *in*, not; *mortalis*, subject to death). Condition of being exempt from death. Belief in life after death has been almost universal, but its character has varied greatly. At first it may have been due to the dream-images of departed friends or to similar causes, but it persists when such supports have long passed away, and rests upon many dimly-felt lines of evidence. The force of some of these can be recognized by all, but others are bound up with moral and spiritual insight and experience. A full belief in immortality is a prize to be won, and we find retrogression as well as advance in men's thoughts about the future life, among both nations and individuals. The Egyptians and the Persians seem to have possessed noble conceptions of the life to come earlier than the Hebrews, but to have failed to maintain them owing to the lower character of their religion.

The simplest arguments for the continued life of the soul after death are these: The principle of conservation demands it. The dead body is no equivalent for the living man. Something has passed away, upon which its life and activity depended, and we cannot suppose that this has been annihilated. The soul, that "constant centre, to which we refer all our acts as their source and all our experiences as their receptacle" (Martineau), is directly known by us to have an existence of its own, and there is nothing to show that the death of the body destroys it. The exact relations of soul and body constitute an unsolved problem; each has the power to affect the other. But all true human activity is initiated by the soul, and the soul affects the body more than it is affected by it.

Materialism, which represents the soul as a mere "epiphenomenon" or secondary phenomenon of the body, is false for two reasons. First, it is only through the soul's consciousness that material things are known at all; secondly, material changes depend upon antecedent conditions, while the changes brought about by the power of our wills are due to ends which we are seeking in the future.

All such arguments, however, for a future life afford little satisfaction. Not only do they apply to living creatures other than men, but they suggest an impoverished existence after death, rather than a nobler one. Far more satisfying arguments are drawn from the moral and spiritual experience of mankind, and it is to these that we must turn. We observe then, first, that just as science would be impossible unless we started with the assumption that the world is an intelligible whole, so religion and morality would be impossible unless we started with the assumption that the world is also morally intelligible to the innate moral sense of man.

But this demands a future life for many reasons. The long course



Immingham, Lines. Part of the dock system; the power house is seen in the left background, with the general office on the right

of evolution has led up to man; if the world has a meaning, that meaning must be bound up with man; and human nature is not intelligible if death is the end. Human nature is far too great a thing for the present world. It can neither be satisfied here, nor realize here more than a small part of its possibilities. All that is best in man bears witness to an illimitable power of life and growth, and it is upon this that the value of human personality depends. The best men and women have ideals of truth, beauty, goodness, and love, for which they will make the last sacrifice, and thus assert their abiding value.

Our instinctive claim for justice demands a future life. We cannot rest in the thought of a world in which goodness and happiness are not found ultimately to be united, and this they are not in the world as we know it. Not only does individual human life demand a future indefinitely extended, if it is to be intelligible, but the corporate life of the race also demands it. The force of these deeper arguments will vary with the value we have come to set upon truth, beauty, and goodness, and the sacrifices we have made for them.

In Europe and America today belief in the future life rests largely upon the teaching of the Christian Church, but the considerations outlined above have their place in the experience upon which the Church relies. More slowly, but more surely than some other nations, the Hebrews had reached before the birth of Christ a noble belief in immortality. It seems to have rested mainly upon two considerations. First, since the Hebrew saints had suffered for their highest ideals as no others had done, they understood as no others that the sufferers must have their share in that "kingdom of God" where righteousness will be at last triumphant. Their belief in the resurrection was essentially a belief in the wholeness of life, a belief that nothing would be lost of the full personality of the servant of God. Secondly, the Hebrew saints attained to a deeper communion with God than others, and found in Him the "fountain of life." Those who were one with Him and His purpose felt that they were assured of eternal life in Him.

Now all that the Hebrews had thus come to believe was confirmed by the teaching of Christ, and still more powerfully by His resurrection. The life of Christ was itself a life spent in the cause of righteous-

ness, and at last sacrificed for it; it was also the one life lived in perfect union with God and conformity with His will.

Not only did the value of that life demand its continuance, and the instinctive claim for justice demand its vindication, but the Christian Church was founded upon the certainty of the Apostles that the risen Christ had repeatedly manifested Himself to them, and assured them that the continuance and the vindication had been in fact given. Moreover, the Apostles were conscious that the life of the risen Christ was by His Spirit reproduced in themselves, so that eternal life was already their possession. It was a life which led them continually to service and sacrifice like that of their Master; but it was a life over which death could have no power. *See Heaven; Purgatory; Survival.*

H. L. Goudge

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Immortals. Name popularly given to men and women famous in history in whatever association. Thus certain Persian troops, Julius Caesar, Joan of Arc, and Napoleon are referred to as immortals. The word is now specially used to designate the members of the Académie Française (*q.v.*).

Immunity. The capacity of an animal organism to resist the effects of bacterial invasion. The term is more loosely applied to signify non-susceptibility to a disease or a poison. Thus the Styrian mountaineer can safely swallow doses of arsenic, and the addict go unharmed by lethal doses of morphia. Immunity may be natural: rats and dogs do not take anthrax, nor negroes yellow fever (conversely, an infection gaining ground where it was hitherto unknown can take severe toll, *e.g.* measles among savage tribes).

Acquired immunity may result from the recovery of a patient from an acute condition. This may be long or short, according to the nature of the disease. Measles and scarlet fever are not caught twice, but after pneumonia there is only a short period of protection against a fresh attack. Influenza carries no immunity.

On this problem of immunity much work was done by Pasteur, who in 1880 showed that active immunity is conferred by the introduction into the body of bacteria,

living or dead, or their toxic derivatives. On this concept the whole structure of vaccine therapy depends. Vaccination against smallpox and inoculation against typhoid and cholera are examples of active immunising.

In the past there have been two theories regarding the nature of immunity: the cellular, associated with the name of Metchnikov, and the humoral, associated with that of Ehrlich. The former thought immunity depended upon the attacking white cells; the latter that bacteria were killed by a substance elaborated in the body fluids. The truth lies between the two. The white cells are inactive against bacteria unless the bacteria are bathed in serum containing the specific antibody of the disease.

Towards the end of the 19th century Behring discovered that the serum of actively immunised animals when transferred to other animals conferred immunity on the latter; this process being termed passive immunity. It is necessarily transient, depending upon the amount of the substance introduced. An example is serum therapy as used in diphtheria; the blood serum of a horse which has been treated with the toxin of diphtheria, to which it has become gradually resistant, is introduced into the body of the patient and lends to him in his fight for health the capacity acquired by the horse to overcome the poison.

IMMUNISATION. This term covers any method by which an animal is rendered resistant to invasion by disease. In smallpox it is now achieved by introducing under the skin the toxin of the allied disease of cow-pox; in cholera, the typhoid groups, colds, etc., by the hypodermic injection of a measured quantity of the dead organisms with their toxins. By using the serum of a patient convalescent from measles or scarlet fever, delicate contacts may be spared these diseases or will take them in a mild form. Vaccination with B.C.G. provides some immunity to tuberculosis and is widely used to protect children.

Imogen. Leading female character in Shakespeare's tragicomedy *Cymbeline* (*q.v.*). She is the prototype of devoted wives and resourceful women.

Imola (anc. Forum Corneli). City of Italy, in the prov. of Bologna. It is picturesquely situated on an island in the Santerno, 21 m. by road and rly. S.E. of Bologna on the route to Ancona. Its 12th cen-

ture cathedral has been modernised. Other ancient churches and palaces include that of Catherine Sforza and the Palazzo Paterlini. It has a 14th century citadel, now utilised as a prison, a large mental hospital, an agricultural school, and a public library containing valuable MSS. Imola has been the see of a bishop since the beginning of the Middle Ages. Wine and vegetables are produced, and the manufactures include soap, majolica, gunpowder, brick, silk, leather, and glass. Pop. (1951) 46,479.

Impact. Collision of two or more objects. The force involved may be large but acts for only a short time. The force varies in a complicated manner during the collision and is dependent upon the elastic properties of the bodies involved as well as upon their speeds. In studying such problems it is usually more convenient to consider the momentum of the system. Unless an external force acts on the system, the momentum lost by one body (or set of bodies) is equal to that gained by the other body (or set of bodies). Only with perfectly elastic bodies would the total kinetic energy be the same before and after contact, because with imperfectly elastic or inelastic bodies some kinetic energy is transformed into heat on impact.

Impala. Native name for the S. African antelope (*Aepyceros melampus*), sometimes also termed pala. It is a rather large species, slightly more than three feet in height, with somewhat spirallyrate horns. It is described by hunters as the fleetest of the antelopes. From its red colour it is known by the Boers as the rooibok.

Impaling (Lat. *in*, on; *palus*, stake). In heraldry, a method of marshalling two or more coats of



Impaling in heraldry

arms on one shield, the arms being placed side by side. This was usually done to record matrimonial alliances, the arms of the husband occupying the dexter half and those of the wife the sinister side, but if the wife was an heiress, holding superior feudal estates, her arms took precedence. In some instances a husband placed his own arms between those of his second and first wife. Arms of office, e.g. those of a bishopric, deanery or king-of-arms, are also impaled, these taking precedence

of the paternal coat. See Coat of Arms; Heraldry.

Impasto (Ital., spread with paste). Term used in painting. It denotes the laying on of opaque colours in thick masses diluted with no other vehicle than a limited quantity of oil. Its effect is supposed to add strength and solidity to the work, and to enhance its richness. See Painting.

Impeachment (Fr. *empêchement*, from late Lat. *impedicare*, to fetter the feet). In English law, parliamentary prosecution by the house of commons, before the house of lords as judges, of a person accused of treason or any other crime or misdemeanour. Being, in Blackstone's words, a "presentment to the most high and supreme court of criminal jurisdiction by the most solemn grand inquest of the whole kingdom," this form of judicial procedure was reserved for ministers of state and other great personages charged with treason or gross maladministration, and is now virtually obsolete, although the house of commons undoubtedly retains its powers in this respect unimpaired.

The initiative rests exclusively with the commons, who, having decided to act, appear in the person of the mover of the motion at the bar of the lords and there impeach the accused in their own name and the name of all the commons of the U.K. The actual procedure follows the lines of an ordinary trial. At the conclusion the president, either the lord high steward or the lord chancellor, calls upon each peer individually to declare upon his honour whether the defendant is guilty or not guilty. The first person to be impeached was Lord Latimer in 1376, and the last Lord Melville in 1806. The most memorable impeachment was that of Warren Hastings (*q.v.*), begun in 1788 and ended with an acquittal in 1795.

In the U.S.A., impeachment is still a living part of the political and legal system. Many officials besides occupants of the highest posts are amenable to it. The federal constitution prescribes that "the president, vice-president, and all civil officers of the U.S. shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes or misdemeanours." The house of representatives has the sole power of impeachment, and the senate, sitting for the purpose on oath or affirmation, must try the case. No person may be convicted without the concurrence of

two-thirds of the members present. Judgement must not go further than removal from office and disqualification to hold further office.

There have been thirteen such trials. The only president impeached was Andrew Johnson in 1868, for usurpation of the law, corrupt use of the veto power, interference at elections, etc. His trial, lasting three months, ended in acquittal. Charges brought against officials have included drunkenness, disregard of statutes, misconduct at trials, tyrannous treatment of counsel, supporting the secession movement (in 1862), accepting bribes. The latest impeachment trial took place in 1936.

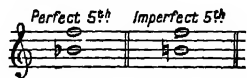
Impedance. In electricity, the combined effect of resistance and reactance (both inductive and capacitive) in an alternating circuit, analogous to resistance only in a direct circuit. Thus the impedance $Z = V/I$, where V and I are the root mean square values of e.m.f. and current respectively. Moreover if R is the resistance and X the reactance of an alternating circuit, then $Z = \sqrt{R^2 + X^2}$. The reciprocal of impedance is admittance, analogous to conductance in a direct circuit, and is useful because it makes possible the compounding of the elements in parallel circuits by simple addition.

Imperative (Lat. *imperare*, to command). In grammar, one of the modes or moods of the verb. It denotes that the action is not stated as a fact, but in the form of a command or request, which may be distinguished by the tone of voice. The stem alone, as the simplest form of the verb, may be used to express this (as in English), although personal suffixes may also be added. Virtually an interjection, the imperative may be represented by a single noun (e.g. silence!). In philosophy, the term categorical imperative (invented by Kant) signifies the absolute command of the moral law.

Imperfect (Lat. *imperfectus*, incomplete). In grammar, a tense or time of the verb. It expresses incomplete or sustained action in the past (I was reading, when). In the Slavonic languages, it is the name of one of the "aspects" or forms of the verb which express modification of the original meaning. The imperfect aspect may refer to present, past, or future (I am writing, I was writing, I shall be writing). See Grammar.

Imperfect. Term employed in music. (1) Amongst consonant intervals, thirds and sixths are sometimes known as imperfect.

(2) Intervals of fourths or fifths, which are a semitone less than perfect fourths or fifths, are called imperfect, e.g.



(3) Duple or quadruple time was formerly called imperfect, and was indicated by a half circle C, now corrupted into C; triple time, being reckoned perfect, was shown by a complete circle O. (4) Imperfect cadence is one ending on the dominant chord.

Imperia. Maritime prov. of Italy, and its capital, both formerly called Porto Maurizio. The prov., which is mountainous, lies along the Ligurian Sea, and includes the chief towns of the Italian Riviera. It produces olive oil, wine, fruit, and flowers. Area, 456 sq. m. Pop. (1951) 167,673.

The city, a sea-bathing resort on a promontory 70 m. S.W. of Genoa, has a fine domed church. Pop. (1951) 30,586.

Imperial Airways. British national air transport company, merged in 1940 into British Overseas Airways Corporation (*q.v.*). Imperial Airways was itself formed in 1924, and was long the only U.K. company operating regular commercial services.

Imperial Chemical Industries Ltd. Industrial organization formed in Great Britain in 1926 by a merger of four British chemical companies—British Dyestuffs Corporation Ltd., Brunner, Mond, & Co. Ltd., Nobel Industries Ltd., and United Alkali Co. Ltd. Other companies were absorbed later. Many of the plastics, drugs, synthetic fibres, and other products turned out by the co., were unheard of when it was formed. At the beginning of 1957, I.C.I. had some 100 factories throughout the U.K. employing more than 115,000 men and women working on 12,000 different products, including alkalis and acids, dyestuffs, building materials, blasting explosives, ammunition, fertilisers, drugs, non-ferrous metals, plastics, and synthetic fibres. The company was represented in most countries by manufacturing and marketing organizations. Its authorised capital was £220 million, held by approximately 250,000 shareholders.

Imperial College of Science and Technology. A British educational centre, in London. It was established by royal charter in 1907 and includes the Royal College of Science, Royal School

of Mines, and City and Guilds Engineering College. A school of the university of London, specialising in science and engineering, it awards diplomas of associateship (A.R.C.S., A.R.S.M., A.C.G.I.) and membership (D.I.C.). Students who comply with university regulations can take London B.Sc. and higher degrees. Administration is vested in a governing body representing the crown, the dominions, the ministry of Education, the university of London, the L.C.C., the City and Guilds of London Institute, the royal commissioners for the exhibition of 1851, the Royal Society, the professorial staff of the college, and learned societies. Plans for expansion were in hand in 1957. The postal address is Prince Consort Rd., S. Kensington, S.W.7.

Imperial Conference. Meeting of representatives of the nations of the British Empire. Until 1947, when India achieved independence within the empire, and Burma left it, the conference was constituted as follows: the prime minister and other ministers of the U.K., Canada, Australia, New Zealand, and South Africa; the secretary for India and Burma; and other representatives of India and Southern Rhodesia. Newfoundland was represented until 1933.

The conference originated in 1887, when representatives of the self-governing colonies in London for Queen Victoria's jubilee met to discuss Imperial problems. A second meeting was at Ottawa in 1894. At the fifth meeting, in London in 1907, it was decided that the designation should be changed from Colonial Conference to Imperial Conference, and that meetings should be held every four years. In 1917 came the Imperial War Conference. A premiers' conference met in 1921. London was again the scene of conferences in 1923, 1926, and 1930. The Irish Free State (later Eire) first took part in 1923, and Southern Rhodesia in 1930, when the statute of Westminster was drafted to define the relationship between the dominions and the mother country.

An Imperial Economic Conference at Ottawa in 1932 resulted in the adoption of a more vigorous policy of imperial preference. The conference in London in 1937 found Burma represented for the only time, but this meeting, held in conjunction with the celebration of King George VI's coronation, was not attended by Eire. The

name was not used after 1947 for meetings of Commonwealth representatives, though such meetings continued to be held.

Imperial Defence. Coordination of defence organization and services for the protection of the British Empire. In general the dominions are responsible for the defence of their own immediate areas, but strategic defence of the Empire is undertaken by the U.K. government. Up to 1946, questions affecting strategic defence were considered by the Imperial Defence Committee, which co-ordinated the work of sea, land, and air forces, until superseded by a Defence Committee under a cabinet minister. Land, sea, and air forces of the dominions are maintained at their expense, while colonies and protectorates usually make contributions towards the cost of imperial defence. See Defence Committee; Defence, Ministry of.

Imperial Guard (*Fr. Garde Impériale*). French military corps. It grew out of the Corps of Guides

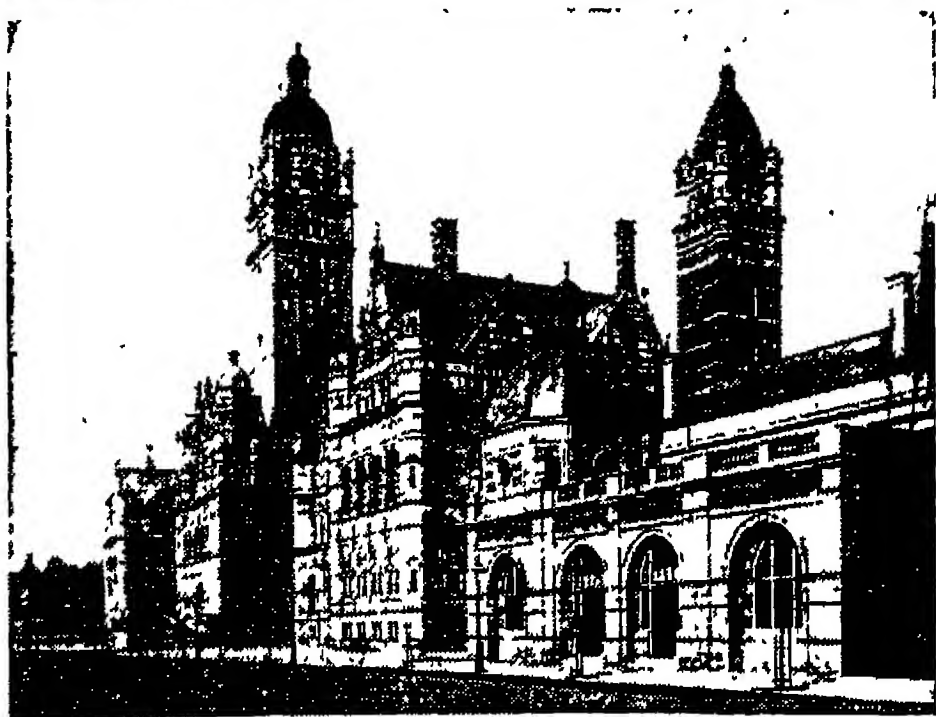


Imperial Guard of Napoleonic wars

used by Napoleon in his Italian and Egyptian campaigns. This became the Consular Guard, and the new title was introduced when Napoleon assumed the imperial title.

Its strength increased from about 10,000 in 1804 to more than 100,000 in 1814. During that period it had been divided into the Old and the Young Guard, and played a great part in many of the Napoleonic campaigns. When Napoleon returned from Elba he gathered a remnant of his Guard, but the corps was broken up by the Restoration. It was restored by Napoleon III by decree of May 4, 1851, and developed to a war-footing strength of about 55,000, but it did not survive the fall of the empire in 1870.

Imperial Institute. Society founded in 1887 to commemorate the golden jubilee of Queen Victoria, the name being also long used for the building in S. Kensington erected to house the organization, a structure in the Renaissance style, with a main portal surmounted by the Queen's Tower.



Imperial Institute, South Kensington. The main façade and tower of the original building from the south-east

crowned by a dome containing a peal of bells rung on royal occasions. This tower, 287 ft. high, was solidly built of bricks set in cement. The front was faced with Portland stone embellished with mouldings and carvings.

The Imperial Institute was established to promote a better knowledge of life in the overseas empire and a feeling of unity among its peoples. There is a department devoted to plant and animal products, another to mineral resources. Laboratories are maintained for the examination of raw materials, and reports as well as numerous other publications and a quarterly bulletin are issued. Public exhibitions are arranged, and lecturers visit schools to give talks about the Commonwealth. Expansion of the Imperial College of Science and Technology (*q.v.*) made it necessary to move the Imperial Institute. Plans for building in the Holland Park district were announced in 1957.

Imperialism. Term derived from the Latin *imperium*, meaning originally military authority, and then empire. Imperialism is belief in the expansion and development of an empire. The word came into general use in the latter part of the 19th century to describe the policy of those who held this belief in regard to the British Empire.

The imperialists supported the S. African war, and a foreign policy that aimed at maintaining, by arms if necessary, the prestige of Great Britain. They held that the spread of British rule and influence was beneficial to mankind, and were in favour of strong armaments. Imperialists called their opponents Little Englanders, and from about 1895 the Liberal party was sharply divided on imperialism. The movement was a reaction from the dominant teach-

ing of the middle of the 19th century represented by the Manchester school, and it found powerful advocacy in J. R. Seeley's *Expansion of England*.

In the mouth of opponents both in Great Britain and abroad, the designation imperialist came to be something of a term of abuse, implying an exploiter of subject peoples.

It was used thus of the British by the Germans with, by the citizens of the U.S.A. without, envy. Later the U.S.S.R. adopted imperialism as a derogatory term for the anti-Communist attitude adopted especially by the U.S.A.

Imperial Light Horse. Force raised in Natal at the outset of the South African War. It was composed mainly of Uitlanders from Johannesburg, and took part in the relief of Mafeking. See South African War.

Imperial Preference. Term for the giving of preference as regards import or customs duties to goods from one part of an empire entering another part. The practice exists within the British commonwealth. In 1897 the Canadian government allowed a preference to British goods of 33½ p.c. off the duties payable; but the first major step in the U.K. was taken as a result of the Imperial War Conference of 1917, whereafter under the Finance Act, 1919, duties were reduced or abolished on a number of imports from the Empire entering Great Britain, *e.g.* tea, coffee, cocoa, sugar, dried fruits, tobacco, motor spirit, wines and spirits, motor cars and cycles, clocks and watches, films, musical instruments. The preferences were extended 1923.

At the Ottawa Conference of 1932 it was agreed that duties were to be imposed on wheat and other foodstuffs, and a quota was fixed for bacon, beef, and mutton produced in the dominions. The Import Duties Act imposed a duty of 10 p.c. on all goods imported into the U.K., with exceptions among which were all goods exempt under imperial preference. As a result of this policy the proportion of exports from the U.K. which went to countries of the British Empire reached 50 p.c. by 1937 and the proportion of U.K.

imports drawn from the Empire rose to two-fifths. Requested to abandon imperial preference during the negotiations in 1945 for a U.S. loan, the U.K. refused, but in the Geneva tariff agreement of Oct., 1947, agreed to the reduction by other Commonwealth countries in certain margins of preference. See *Empire Free Trade*; consult also *Imperial Preference*, R. S. Russell, 1947.

Imperial Service Order. Meritorious and long service decoration for members of the civil service.



Imperial Service Order, men's ribbon and star

Instituted by Edward VII in 1902, and extended in 1909, the companionship is confined to 700 members of the clerical and administrative branches, this number including 250 for home civil service, 250 for civil servants of colonies and protectorates,

and 200 (100 Europeans and 100 natives) for the Indian civil service. Qualifications are 25 years' (20 in India, or 16 in certain unhealthy stations) service. The order can, however, be bestowed upon those who have performed meritorious service without having completed these periods. Men and women are equally eligible. Companions take precedence after those of the Order of the British Empire, 4th class, and immediately before those of the Royal Victorian Order, 5th class.

The badge for men is an eight-pointed star of silver, whereon is a gold medallion bearing the royal and imperial cypher in blue, within a circlet inscribed "for faithful service." For women the badge is a similar plaque, but surrounded by a wreath of laurel in place of the star. The ribbon is a stripe of blue between two of crimson of equal width, the woman's worn as a bow. Members of the civil service not eligible for the order may be granted the Imperial Service Medal under the same conditions.

Imperial Tobacco Company. Formed in 1901, when leading firms in the tobacco trade in Great Britain joined forces to combat the growing competition of U.S. manufacturers. A settlement was eventually reached by which the British and U.S. combines retained their spheres of

influence in their own territories, and a new British-American Tobacco Company was started to acquire the goodwill in all other parts of the world and in the ships' stores trade. The company has its own leaf-buying organizations in the U.S.A., Canada, Rhodesia, Nyasaland, and Syria. It was a pioneer in developing Empire tobacco. Products of the subsidiary companies are marketed under their own names. The head office is at Bristol.

Imperial Valley. Region in Imperial co., California, U.S.A., and Lower California, Mexico. Part of the Great Colorado Desert, as a result of irrigation it has become one of the richest farming areas in the U.S.A. In 1944 the region contained 523,000 irrigable acres, yielding crops to the value of £15,400,000. The valley, 110 m. long and 40 m. wide, has the Colorado river on the E. and the Coast Range on the W. It is mostly below sea level.

Imperium (Lat. *imperare*, to command). Term used to designate the power possessed by certain magistrates of ancient Rome (consuls, praetors, dictators). The imperium included among other things the right to raise and command armies. The outward symbol of the imperium was the *fascēs* (*q.v.*). Imperium was also granted to ex-magistrates charged with the administration of a province. See Rome.

Impermeable Barriers. Geological term. Different rocks show varying degrees of permeability to the passage of solutions; any rock relatively impervious is said to constitute an impermeable barrier. These barriers are important in the localisation of ore, water, and oil. Solutions rising through pervious strata may be trapped when they meet a "blanket" of impervious rock, or the latter may act as a filter. Shale bands, fault gouge, and sheets of igneous rock often give impermeable barriers.

Impetigo Contagiosa (Lat., contagious skin-eruption). Disease of the skin due to infection by micro-organisms, usually streptococci and staphylococci. More frequent in children than adults, attacks are not confined to those living in dirty and unhealthy surroundings; it is easily conveyed from one person to another. An eruption of small vesicles first appears on the skin. These later contain pus, then dry, forming yellow crusts about $\frac{1}{4}$ in. or more across. The disease is most fre-

quently seen on the face, scalp, and neck. Treatment is to remove the scales by a starch poultice and apply a mild mercurial ointment. Penicillin and the sulphonamide group of drugs are useful, also gentian violet.

Impey, Sir ELIJAH (1732-1809). British lawyer. Born at Hammersmith, June 13, 1732, he was educated at Westminster and Trinity College, Cambridge. Called to the bar in 1756, he became recorder of Basingstoke, 1766, and counsel to the East India



Sir Elijah Impey,
British lawyer

Company in 1772. Knighted, he was appointed chief justice to the new supreme court of Calcutta, 1774. In the case of Nuncomar, Impey won universal praise for his impartiality. In 1782 he endeavoured to extend his jurisdiction to Lucknow, but incurred the enmity of Sir Philip Francis who brought about his recall in 1783. The fall of Warren Hastings involved Impey, against whom charges of corruption were brought. He defended himself successfully before the house of commons but resigned his post. M.P. for New Romney, 1789-96, he died Oct. 1, 1809. See Hastings, Warren.

Imphal. Capital of Manipur state, Union of India, close to the frontier with Burma. The plateau extending S. is known as the Imphal Plain. In March, 1944, Imphal, to which the Allied 4th corps had retreated, was isolated and besieged by advancing Japanese, but held out until June 22, when the 33rd corps reopened the road from Kohima (*q.v.*), 80 m. N. in the hills. When the Allies resumed the offensive, Imphal became a military, air, and supply base. Pop. 80,000. See Burma Campaign.

Implacable. Former British training ship. Originally the French Duguay-Trouin, she was captured by Sir Richard Strachan after the battle of Trafalgar and under the name Implacable served with the British fleet until 1822. In 1925 she was fitted out as a training ship by the Society for Nautical Research, and anchored off Portsmouth. She was taken over during the Second Great War by the Admiralty, but restored to the society in 1947. On Dec. 2, 1949, being beyond repair, she

was taken to sea and scuttled off the Isle of Wight. Two caskets made from her timbers, presented in 1950 by the British to the French govt., were placed on capstans in naval museums at Paris and at Rochefort, where she was launched.

Importance of Being Earnest, THE. Farcical comedy in 3 acts by Oscar Wilde. The astonishing sequences of witty and epigrammatic remarks entitle it to rank among comic masterpieces. Produced Feb. 14, 1895, at the S. James's Theatre, London, it had a short run; the cast included George Alexander, Allan Aynesworth, Irene Vanbrugh, and Evelyn Millard. In a notable revival in 1939 Edith Evans, Peggy Ashcroft, John Gielgud, and Jack Hawkins appeared. Edith Evans, Michael Redgrave, Margaret Rutherford, and Miles Malleon played in a film version 1951.

Imports. Goods conveyed into a country by any means; the opposite of exports. Imports are inspected and valued by customs officials, who collect taxes when these are payable. The value given to imports includes the price charged by the supplier, plus expenses of insurance and carriage or freight to the place of importation (*o.i.f.* value). Exports are valued free-on-board (*f.o.b.*), *i.e.* cost of insurance and freight is not included. Hence the total of the world's imports exceeds that of exports.

Details of imports and exports of the U.K. are known as board of trade returns, published monthly in the Board of Trade Journal and there periodically analysed to show changes in volume, value, and geographical distribution. British imports are classified in five main groups: (1) food, drink, and tobacco; (2) raw materials and articles mainly unmanufactured; (3) articles wholly or mainly manufactured; (4) animals not for food; (5) parcel post. In 1951 the first three classes were respectively (approx.) 31, 34, and 23 p.c. of the total, £3,914 millions; in 1948 the corresponding figures were 42, 32, and 23 p.c. of the total, £2,080 millions; in 1938 they were 46, 27, and 25 p.c. of the total, £920 millions. Principal sources of imports in 1951 were the U.S.A., Canada, Australia, New Zealand, India, Sweden, France, Netherlands, Denmark, Finland, Nigeria.

The term invisible imports denotes money values that have to be paid to foreign countries.

Imposition (Lat. *in*, on; *ponere*, to place). Literally, the laying of something on another person. It is thus used for a tax or other burden, especially one regarded as unjust or unfair, and also for a punishment given to schoolboys. Other uses are for the laying on of hands by a bishop, and for the arrangement of pages of type during printing. It is used for an act of dishonesty.

In English history the name was given to some additional duties levied on certain imports by James I in 1606. He did this without the authority of parliament, and a merchant named Bate refused to pay. The courts supported the king, holding that his prerogative gave him the power to do this, and in 1608 further impositions were levied. In 1610 parliament declared impositions illegal.

A variant of the same word is *impost*. This is used for a tax or duty levied on goods imported or exported. It is used in architecture for the upper part of a pillar or pier, upon which rests the weight of an arch.

Imposture. Act of deceiving, especially by assuming a name or character other than one's own, or otherwise carrying out an impersonation for selfish motives. The term covers such comparatively unimportant deceptions as those of the beggar describing himself as a shipwrecked sailor, or the quack using a doctor's title, and also more ambitious frauds which have had historical or religious importance.

In this latter connexion many persons, often demented, have won a following by claiming to be of divine origin, or to be the Messiah of their race. Joris David, of Ghent, announced himself as the son of God, and died at Basel in 1556, foretelling his resurrection after three years. Joanna Southcott still has believers in her divine attributes, and Joseph Smith founded the sect of Mormons (*q.v.*) on revelations of doubtful authority. Similarly Islam has produced its false prophets, *e.g.* the Mahdis of the Sudan.

Historical impostors in England have included Lambert Simnel, with his personation of the earl of Warwick, 1487; Perkin Warbeck, who passed as Richard, brother of Edward V, 1492-98; and Elizabeth Barton (*q.v.*), executed in 1534. The Tichborne case (1872-74) was a celebrated lawsuit. The mysterious fate of Louis XVI's heir

brought several claimants to the titles of Louis XVII and XVIII, notably in 1874.

In 1906, a German cobbler, Wilhelm Voigt, disguised as a guards' officer, confiscated the town funds of Köpenick, near Berlin, sending off the chief municipal officials to the capital under military escort; he was sentenced to four years' imprisonment, but released after 20 months. In 1898, De Rougemont (*q.v.*) imposed upon several learned societies with fabricated travel tales. The U.S. explorer Frederick Cook (1865-1940) claimed, 1909, to have reached the North Pole on evidence which was rejected.

Literary impostures and forgeries are numerous. Apocryphal Gospels were common in early times; it has been said that in the 4th century there were about 80 such; and over the False Decretals (*c.* 835) controversy raged for centuries, until they were condemned as false by Pope Pius VI, 1789. In 1704 a fabricated account of the island of Formosa, by George Psalmanazar (1679-1763), attracted much attention. Cagliostro (1743-95) passed off a Polish count's novels as his own. The Rowley poems of Chatterton were issued in 1777 as having been discovered in the MSS. of a 15th century monk, Thomas Rowley. The Ossianic poems published by James Macpherson (1736-96) were probably in great measure from his own pen, not, as claimed, of ancient Celtic origin. Scott in 1806 was imposed upon by the self-made ballads of Robert Surtees, who declared their traditional sources.

Imposture by means of forged works of art is no less common. Noteworthy instances have been the faked bust ascribed to da Vinci, purchased by the well-known German art expert, Wilhelm Bode and the discovery in Paris of a regular trade in forging paintings, to which the name of Corot was assigned. In 1945 a Dutch painter H. van Meegeren admitted to having produced at least seven pictures which experts attributed to Vermeer. One of these forgeries was bought by the Rembrandt Society for £50,000 approx. In 1947 van Meegeren was sentenced to a year's imprisonment, but died a few weeks later. See Bertram, C. J.; False Antiquities; Ireland, W. H.; Literary Forgeries; Wise, T. J.

Impotence (Lat. *impotentia*, inability). Term in medicine and law meaning inability to have

sexual intercourse. In the male the principal causes are advanced age, with glandular failure (although there are many records of men becoming fathers after the age of 80); organic disease, such as locomotor ataxia and other affections of the spinal cord; less frequently, diseases of body chemistry such as diabetes; or local injury to or disease of the parts. A man may be capable of intercourse with one woman and not with another. Also, nervous conditions such as neurasthenia or hysteria, or a shortage of vitamins with abstinence from the normal sexual life (*e.g.* among prisoners of war), may sometimes be responsible for the condition.

In the female the most frequent causes of impotence are a resistant hymen (*q.v.*), spasm of the vagina (*q.v.*), or local inflammations occasioning pain. Distress often arises through ignorance of the mechanics of intercourse.

If the sexual act is unsatisfactory, medical help must be sought at once. Treatment involves combating the underlying cause, which may mean psychological as well as physical investigation. A physical cause may yield to high vitamin intake, stimulation by specific substances such as strychnine and the indicated glandular extracts, or other remedies prescribed by the doctor. If the cause is psychological, there is a high probability of cure by psycho-analysis.

Impotence is a ground for a suit of nullity of marriage. It is, however, of less importance than formerly, as, under the Matrimonial Causes Act, 1937, a marriage may be annulled if there is a wilful refusal to consummate it; it is not necessary to show that the non-consummation is due to impotence.

Impregnable. Shore establishment of the Royal Navy, at St. Budeaux, Plymouth, serving as an overflow for the R.N. barracks at Devonport. Impregnable was originally the name of a training establishment for boys, located in four hulks anchored in Devonport harbour; these were also the official flagship of the c.-in-c. at Devonport. This Impregnable was closed in 1928 and training transferred to shore barracks; the name was revived for the St. Budeaux barracks in 1936.

Impressionism. Name given to a movement in art, originating with a group of French painters in the last quarter of the 19th cen-



Impressionism. Vétheuil: Sunshine and Snow, a painting by Claude Monet, first of the Impressionists, who concentrated on the rendering of light and atmosphere. This work is in the Tate Gallery, London

tury. Its central principle was that the hand should record exactly as the eye sees as for the first time. All conventions of lighting and composition are ruled out by this formula; so are all attempts to be didactic or to "tell a story." The Impressionist is less concerned with known facts than with pure vision; only the objects in nature, as it appears behind its veil of atmosphere, must be set down. Edouard Manet (*q.v.*) is often acclaimed as the first Impressionist, but this is true only in so far that Impressionism arose out of the *plein air* (*q.v.*) school, of which he was the chief exponent. Manet disregarded many conventional niceties, but he never obliterated form to the extent adopted by the painters who established French Impressionism as now understood.

At the head of these was Claude Monet. Realizing that the play of light and atmosphere had hitherto occupied too little, and form too much, attention from artists, he sought to remedy this by making form wholly subservient to light and atmosphere. Thus his characteristic pictures are pictures of light and atmosphere, with only the vaguest suggestion of form.

It was Monet's work that brought the term Impressionist into use. In 1874 an exhibition of open-air pictures was held by Monet and his friends in the Boulevard des Capucines, which included a picture by him with the title *Impression: Soleil Levant*. This title was seized on by Le Charivari as a peg on which to hang a string of vitriolic abuse of the

artist and his companions. A series of similar exhibitions quickly followed. Monet's associates and disciples included A. Renoir, C. Pissarro, Berthe Morisot, Mary Cassatt, and Charles Sisley. Degas was really only allied to the group by his revolt against the Romanticist view of life and his modern feeling for movement. Whistler was Impressionistic in his later etchings and his nocturnes; Cézanne, Gauguin, and Van Gogh groped after Impressionist ideals before they were absorbed by Post-Impressionism (*q.v.*), and as the movement gained strength a large number of outside painters were drawn to adopt its outlook and its general principles of colour.

In 1876 Caillebotte, an art connoisseur rather than an artist, began to exhibit with the Impressionists in Paris. He died in 1894, having acquired a fine collection of his friends' works, which he bequeathed to the Luxembourg. Several years before that, the Impressionists had virtually won their battle; but they had also, to some extent, become divided. In 1886, Neo-Impressionism (*q.v.*), under the leadership of Seurat and Signac, had started, and Post-Impressionist influences were beginning to make themselves felt. In 1889 an English group, including Wilson Steer, Walter Sickert, and Francis Bate, held the first Impressionist exhibition in London.

To some extent Impressionism, contemporaneous as it was with the growth of interest in photography, was parallel to photography in its attempt to turn the human

eye into a kind of camera, recording everything in terms of light only. It is fair to say, too, that the revealed limitations of photography served to reveal the limitations of the Impressionist theory, especially as expressed in the pseudo-scientific devices employed by the Neo-Impressionists. Nevertheless the movement, like all vital art movements, "cleared the air" of many outworn conventions.

Imprisonment. In law, any act whereby another's liberty of movement is forcibly interfered with, so that "he hath not liberty to go about his business." If that act is carried out by someone who has not the authority to do so it becomes false imprisonment, and an action for damages for wrongful detention lies, unless justification can be proved. Such detention need not be in a gaol. It may be merely such detention or prevention of freedom of movement as interferes with a man's ordinary avocations, as by locking him in a room, or compelling him to remain somewhere by threat, or even by standing at the end of a cul de sac and refusing to let him pass.

In the commonly accepted sense of the word imprisonment is used for confinement in a properly constituted prison or place of detention by constituted authority. In the U.K. simple punishment was introduced later than penal servitude; persons sentenced to the latter served their sentence in penal settlements and not in prisons. Maximum sentence of imprisonment was usually two years, although when a person was sentenced on several charges he might receive two years' imprisonment on each, and the terms might be ordered to be concurrent.

The Prison Act, 1898, established the triple division of offenders, enabling the court in passing sentence to direct that a prisoner not sentenced to hard labour should be placed in the first or second division. If no direction were given the prisoner was automatically placed in the third division. Persons imprisoned under the Vaccination Acts or convicted of sedition or seditious libel were placed in the first division; but otherwise this system had in practice proved a dead letter, and the class into which any prisoner should fall was usually determined not by the court but by the prison authorities. Prisoners under 21, and star class prisoners, *i.e.* those who had not been previously convicted of serious crime and were not habitua-

criminals, received special treatment. Special rules governed the treatment of persons imprisoned for debt or for contempt of court; awaiting trial; appealing, and under sentence of death.

Clauses of the Criminal Justice Act, 1948 (which was based on a 1939 bill dropped on the outbreak of war), abolished hard labour, prison divisions, and penal servitude, leaving imprisonment the only form of prison sentence which could be imposed. See Prison and Prison Reform; Punishment; Reformatory Schools.

Impromptu de Versailles, L'. One-act comedy by Molière. It was planned, written, and acted at Versailles in a week, at Louis XIV's suggestion, in reply to the author's critics. Produced Oct. 14, 1663, it showed Molière, in his own person, discussing the art of acting.

Improvement. A legal term used in connexion with land. A tenant of agricultural land or of trade or business premises may be entitled to compensation for certain improvements carried out by him to the premises. Where a landlord has carried out certain improvements to agricultural land, or to premises controlled by the Rent Restriction Acts, he may be entitled to increase the rent. Improvements to any premises may require permission from the local planning authority and involve the payment of a development charge under the Town and Country Planning Act. Improvements may be carried out on settled land under the Settled Land Acts. The trustees of the settlement may pay, and in some cases may, and in others must, call on the tenant for life to refund the money. See also Betterment; Landlord.

Improvisation (Lat. *improvisus*, unforeseen). Art of composing verses impromptu or without forethought. Though practised by the ancients, it is more especially an Italian art. In the spontaneous rhapsodies of the *Improvvisatori* of that country we perceive, says Sismondi, how truly poetry is the immediate language of the soul and of the imagination. Many of the Italian masters of improvisation could produce verse only by improvising—doing so on themes suggested, and often in measures indicated, by their listeners. In music the word is similarly used, meaning performance without the notes having been previously written down. See Jam Session.

Impulse. In physics, the conception of a force acting during a

short time. It is measured as the product of the magnitude of the force and the time during which it acts. With many impacts between bodies, however, it is impossible to calculate the force of the impact, and the impulse is measured by the change of momentum it produces.

Imputation (Lat. *imputare*, to charge to the account of). Theological doctrine of the Calvinist system. It teaches that as the sin of Adam was reckoned to all his descendants, who as a whole sinned in him, so the righteousness of Christ is accounted or imputed to all believers in Him, although they had no share in it. This doctrine plays an important part in all Evangelical theories of the Atonement; but the tendency of theology is to give it less prominence. See Calvinism; Sin.

Imredy, BELA (1891–1946). An Hungarian politician. He was educated at Budapest university and entered the service of the Hungarian national bank, becoming a director in 1929. He was minister of finance 1932–34, and prime minister 1938–39. An ardent pro-German, in March, 1944, he was appointed minister of economic affairs, but lasted only until Aug. Imredy was arrested by Allied troops in 1945 and brought before the people's court in Budapest, accused of war crimes and anti-Jewish acts. He was condemned Nov. 23, and shot Feb. 28, 1946.

im Thurn, SIR EVERARD FERDINAND (1852–1932). British explorer. Son of the banker J. C. im Thurn, he was educated at Marlborough and Exeter College, Oxford. He became director of the British Guiana museum, 1877–82,

and resident magistrate in that colony, 1882–91. He served on the Venezuelan boundary commission, governed Ceylon, 1901–04, and was governor of Fiji and high commissioner of the western Pacific, 1904–10. He was the first to ascend Mt. Roraima, Venezuela. His writings include *Among the Indians of Guiana*, 1883. Knighted in 1905, he died Oct. 8, 1932.

Inagua. Most southerly of the Bahamas, in the British W. Indies. It is 50 m. long by 25 m. wide, and has an area of 670 sq. m. Low-lying, it is fringed with reefs, has salt marshes and good pasture land for ponies and cattle. The principal settlement is Matthew Town, on the S.W. coast of the island, the nearest point to Cuba. Pop. of island, 890. Little Inagua lies about 10 m. off the N. coast. Sparsely populated, it is 8 m. long by 6 m. broad; its area is 35 sq. m.

Inajá Palm (*Maximiliana maritima*). Tall slender tree of the family Palmae, native of S. America. It has long leaves divided featherwise into slender, drooping leaflets. The trunk is 100 ft. or more in height. The flower-spikes are enclosed in woody spathes, 5 ft. or 6 ft. long and 2 ft. broad, so hard that they are used as cooking pots and for baskets and pails.

In articulo mortis (Lat., at the point of death). Term used in English law. Statements made by a man *in articulo mortis*, called a dying declaration, though not on oath, can be given in evidence after his death on the trial of anyone accused of his murder or manslaughter. It must, however, be proved that when the statement was made the dying man had abandoned all hope of recovery.

INCA LIFE AND CIVILIZATION

G. H. S. Bushnell, Curator, Cambridge Museum of Archaeology

In addition see the articles on the various places where there are Inca remains, e.g. Cuzco and Saccaihuanán; on Almagro, Atahualpa, Pizarro, etc.; and on the Aztec and Maya aboriginal American civilizations which developed in Mexico

The rise of the Inca empire in S. America in the 15th century was the last brief episode in the development of aboriginal civilization in Peru, which began before 2500 B.C. The word Inca is used in various ways, but strictly speaking it belongs to a Quechua-speaking people which lived round Cuzco, in the south highlands, before the empire grew up. It is also applied to the empire, the royal family, and to the emperor himself, though he had various titles, including that of Sapa (Unique) Inca. There

was originally a separate Quechua tribe, speaking the same language, living north-west of Cuzco, but they seem to have allied themselves with the Incas in the 15th century, and were afterwards closely associated with them.

The royal dynasty of the Incas is believed to have led its people to Cuzco about A.D. 1200. Whence they came is not known, but as a highland people they are likely to have come from somewhere in the highland zone, possibly not far away. The great expansion of the empire began about 1440.



Inca. "Megalithic" type of building at the fortress of Sacsaihuamán above Cuzco

The first two centuries at Cuzco seem to have been marked by minor wars among the local tribes, culminating in an attack by the Chancas, from the north-west, first on the Quechuas and then on the Incas. The first was successful and the second nearly so, but an heroic defence of Cuzco under Pachacuti resulted in an Inca victory, and he was crowned, it is said, in 1438. This period is marked in Cuzco itself by rare survivals of foundations built of rough stones, and fragments of rather poor early Inca pottery.

The defeat of the Chancas was the signal for the beginning of the great expansion, most of which took place under Pachacuti and his son, Topa Inca, so that by 1490 the empire extended from what is now northern Ecuador to central Chile. Consolidation and small extensions in the north were carried out under Huayna Capac, at the end of whose reign in 1527 the Spaniards were already at the gate. The Inca armies were armed with the same weapons as their opponents and fought in much the same way. Their great advantages were in superior organization, in their supplies, and in being able to choose when to attack, which was bound up with a desire for conquest and a sustained aggressiveness, in contrast to the normal raiding pattern of Andean warfare. They did not always have to fight, since diplomacy, in the shape of a mixture of threats and promises, often served their purpose, a policy which was aided by their custom of allowing chiefs who submitted to remain in office under the authority of the Inca

state. Their most formidable opponent appeared to be the great Chimú state which occupied the north coastal region of Peru; but by threatening it from the north-west, where least expected, and by occupying the sources of water in the mountains, they subdued it without much trouble. Some of their fiercest battles were fought against comparatively small tribes in the highlands of Ecuador, especially the Cayambi in the N.

Hand in hand with the conquest of the empire went its organization. It was a true empire, and the ruler was an absolute monarch who had a real concern for the well-being of the people, if only because he realized that the prosperity of the state depended on it. Most of the Andean tribes were organized in *ayllus*, originally extended family groups, living

in a village or group of scattered dwellings and owning their lands in common. The Incas made use of this unit, but tended to convert it into an administrative group of convenient size, cultivating lands which were divided into three parts assigned one to the state, one to religion, and one to the *ayllu*. The cultivation of the state and "church" lands, or some special-

ised form of work, constituted the only form of taxation, since there was no medium of exchange. A number of *ayllus* made up a province, and the provinces were grouped into the four quarters of the empire, each under an Inca noble of high rank. Two chief things were necessary for the organization and maintenance of the empire: communications and administrators.

COMMUNICATIONS. These were ensured by the construction of roads, paved or cut out of the rock in the mountains, and marked by posts or enclosed by mud walls in the coastal desert. Streams and chasms were spanned by bridges, whose upkeep constituted part of the local labour tax. The highlands were linked together by one highway, which was connected at many points to the coast, where long lengths of road already existed in the conquered states. These were linked into one system and improved.

Since there was no wheeled traffic the roads were not generally very wide, neither was it necessary for them to have foundations that could carry great weights, so they cannot be compared with, for instance, the great roads of the Roman Empire. But their great extent and the difficulty of the country meant that their construction and maintenance was a considerable feat. At



Inca. A fine example of Inca building near Cuzco

intervals along the roads, runners were stationed to carry messages by relay; and storehouses, containing supplies for the army or for use in times of scarcity, and rest houses for official travellers were built.

ADMINISTRATION. Administrators were derived first from the Incas by blood, members of the royal lineages, and secondly from the Incas by privilege, members of other Quechua speaking tribes who had been declared Incas by Pachacuti. These were the higher nobility, and they filled the most important posts. Below them came the *curacas*, rulers of conquered tribes or commoners selected for their ability. These, who were hereditary, ruled the groups of 10,000, 5,000, 1,000, 500, and 100 families into which the *ayllus* were grouped and divided, and they appointed lesser, non-hereditary foremen of groups of 50 and 10 families. Organization did not stop at the group of 10 families, and individuals were divided into 12 age groups, each with specified duties and privileges. A detailed census of people and goods was kept on the *quipus*, bunches of knotted strings, by a special class skilled in their use, for they were merely aids to the memory, not writing, and could be read only by experts.

RELIGION. Important factors in the building of the empire were: the removal of unruly groups of the population to safe areas and their replacement by loyal colonists, called *mitimaes*; the spread of the Quechua language; and the spread of the state religion. The sun was not the supreme god, as is often believed, but there was rather a remote creator god, Viracocha, whose golden image in human form held the chief place in the so-called sun temple at Cuzco. Under him came the sun, moon, thunder, stars, earth, and sea, of whom the sun was chief, partly because of his importance to the agricultural peoples of the chilly highlands, and partly because of the belief that he was the ancestor of the Inca rulers.



Inca. Masonry at Cuzco of square stones with typical doorways

The temple contained images of all these gods and many others, including those of conquered peoples which had been taken to Cuzco to cement their links with the empire. "Sun temples" were also set up in the conquered provinces, and a notable example is that at the old sanctuary at Pachacámac, near Lima, where typical Inca buildings can still be seen alongside the much older ones of the local god.

After the chief gods came many things which were regarded as *huaca*, or things holy in varying degree, such as mountains, trees, rocks, animals, and the mummies of the dead. Lesser beings in the hierarchy were personal amulets or charms, such as crystals, peculiar stones, and small carved objects. Examples are the small stone alpacas, which were used in fertility ceremonies and then buried in the places where the animals were kept (as examples made of pottery are used in the area to this day).

Religion was served by an organization of priests of different grades, and the more important sanctuaries were tended by some of the Chosen Women, sometimes called the Virgins of the Sun. These were picked out from the *ayllus* as girls and specially educated. Some were reserved for sacrifice, some were given as wives to warriors or nobles, some were taken as subsidiary wives by the emperor or kept for the service of religion. They lived in special buildings, and the remains of their house in Cuzco survive in a convent. There were religious ceremonies, with dances, sacrifices, and other features, associated with

each month of the year, but human sacrifice was rare, and generally reserved for special occasions such as the installation or serious illness of an emperor. There was nothing like the blood bath of the Aztecs of Mexico.

BUILDINGS. Wherever the Incas spread they left material evidence of their presence. Inca buildings occur throughout the territory, and the characteristic trapezoidal doorways and niches are

constructed generally of stone in the highlands and adobe on the coast.

They made use of several varieties of stone masonry, all of which can be seen in and around Cuzco. All date from the rebuilding by Pachacuti about 1460, and they correspond to differences in function and origin, not in age. To take two examples, the "megalthic" polygonal type is used chiefly for the retaining walls of platforms or hill slopes, as at the fortress of Sacsaihuamán above Cuzco, and the finest type, of squared stones, was reserved for the most important buildings. The remains of the roads, with their accompanying buildings and bridges, may still be seen in some places.



Inca. Small carved alpaca in stone

ARTIFACTS. Bronze implements, previously confined to a small area in the south highlands, were spread to the limits of the empire, and Inca pottery forms are found throughout, sometimes brought from Cuzco and sometimes made of local wares, particularly the Chimú polished blackware. Late

Inca pottery was well made, and includes several varieties of polychrome ware in black, red, white, and sometimes orange, most often with well-drawn geometrical designs, though some have small insects or animals scattered over the surface of the vessel.



Inca pottery jar

There were a few standard shapes, prominent among which is the aryballus, a jar with pointed base, a pair of handles low down, and a high flaring neck. This was originally designed for carrying liquids in some bulk on the back of the bearer, but it was made in all sizes down to miniatures. There were also plates with bird-head handles, jugs, and flat-based bowls with vertical sides



Inca beaker

Carved stone bowls were made at Cuzco, also waisted wooden beakers, elaborately decorated in inlaid coloured lacquer showing realistic scenes and figures.

The centralised organization which was the strength of the Inca empire under aboriginal conditions proved to contain two fatal weaknesses when confronted with invaders from Europe who had no respect for the semi-divine ruler. A son of the emperor always succeeded to the throne, but he was not necessarily the eldest and there was no defined way of choosing which he should be. It depended on the will of the emperor, and Huayna Capac died suddenly without making his wishes publicly known. As a result, when the Spaniards arrived they found the empire distracted by the conflict between Huascar and Atahualpa. A more serious weakness was that the structure was a pyramidal one, with strong ties between all grades of officials and the emperor, but it lacked horizontal cohesion. When the Spaniards struck at the centre and captured Atahualpa, it fell to pieces. There were desperate rebellions, and isolated pockets of resistance, but with no coordination the rebels failed.

In Camera (Lat., in the chamber). Term used in English law. It means a case heard behind closed doors, the public being excluded. It is a basic principle of English law that all cases shall be heard in public, except when the judge is satisfied that a public hearing would defeat the ends of justice—e.g. in proceedings about a secret process. Among exceptions recently introduced the following may be heard in camera: trials for offences under the Official Secrets Acts (but sentence is pronounced in public); proceedings in juvenile and domestic courts (but the press must be admitted); in suits for nullity of marriage, evidence as to sexual capacity.

Incandescence. State of a body when it has become luminous by virtue of its high temperature. An incandescent mantle is a fabric of highly refractory oxides which glow at a white heat when inserted in a gas flame. Incandescent electric lamps contain fine

threads or filaments of carbon, or more usually tungsten, heated to white heat by the passage of an electric current. The life of these lamps is extended by enclosing the filament in a vacuum or in the atmosphere of an inert gas at a low pressure, so as to reduce the possibility of oxidation.

Incantation (Lat. *incantare*, to enchant). Form of words, usually chanted or intoned and supposed to have supernatural power. The earliest known examples are of Babylonian origin. Incantations, often in the form of doggerel verse, are used in most of the more crude forms of heathen religion, and survive in the folk customs of many Christian countries, as in rhymes used by the peasantry as charms against minor ailments, or to bring fruitfulness to field or orchard. The magicians of old and the necromancers of the Middle Ages made great use of incantations, which were supposed to bind evil spirits, also to heal diseases. See Divination.

INCARNATION: CHRIST AS MAN

Rt. Rev. E. W. Barnes, D.D., F.R.S.

For the personal aspect of the life of Christ see Jesus Christ. Other questions arising out of that life are dealt with under Atonement and Resurrection. See also Arianism; Christianity; God; Gospels; Holy Spirit; Trinity; Virgin Birth

The Incarnation (Lat. *in carne*, in the flesh) is the fundamental belief of the Christian religion. The doctrine of the Incarnation affirms that in the person of Jesus of Nazareth God was made man that man might know God. All who call themselves Christians, except Unitarians, would accept this statement; and many Unitarians speak of Jesus in such a way as to imply that He stood in a special relation to God. It is impossible to claim that Jesus taught man the true nature of God and showed in His life an example of complete loyalty to God without admitting that between Jesus and God there was an intimate bond.

Revelations of the Gospels

All religious men, who carefully reflect upon the teaching and life of Jesus as they are presented in the Gospels, are attracted by the beauty of character and fineness of spiritual insight there revealed. The idea that Jesus was a mythical invention of the early Church can be dismissed as fantastic. It may be argued with some show of reason that the Jesus of Gospel history is an idealised figure, that the biographers of the Galilean artisan suppressed crudities in His teaching and weaknesses in His

character. Critical inquiry, however, does not support such a contention.

It is now generally agreed that the religious teaching known as the Sermon on the Mount comes from a very early lost document, and that it must accurately mirror the mind and the spiritual confidence of Jesus. Christian scholars scarcely now claim that in all its details S. Mark's narrative must be accepted as accurate; they admit that some of the later material incorporated in the biographies of S. Matthew and S. Luke may be legendary; they hold that the Fourth Gospel had better be regarded as an attempt to explain Jesus rather than as a formal biography of Him. But they remain confident that we can know accurately both what Jesus taught and what He was in Himself—and they affirm that His surpassing spiritual insight and His perfection of character are facts which cannot be denied.

The question then arises: In what relation did Jesus stand to God? If we can speak of all righteous men as sons of God, was Jesus but the noblest of His sons? That would be the decisively Unitarian answer. Those who

accept it hold that in His essential nature Jesus was like other men, though superior to them because of His greater religious insight and moral excellence. But this answer has never satisfied, and still fails to satisfy, the majority of Christians. They find an impassable gulf between moral excellence and moral perfection. They believe that between the spiritual insight of great prophets and the final and complete spiritual certainty of Jesus there is the difference which separates an approach to truth from truth itself. And so they affirm the doctrine of the Incarnation. Jesus was not a son of God, but *the* Son of God. He was God in man made manifest.

To work out the meaning of such simple statements, to explain how God and man could be united in Jesus, is profoundly difficult. No solution of such a problem can ever be adequate. But its importance in Christian theology is such that it cannot be ignored.

"The Son of Man"

Today theologians emphasise first that, alike in the N.T. and in the main stream of Christian theology, the complete humanity of Jesus is affirmed. He was not a demi-god. He was perfect man, and usually spoke of Himself as the Son of man. It is only possible to guess at the original Aramaic phrase which has been so translated. But it is probable that Jesus implied that He was man in the fullest and highest sense of the term. Though Jesus did not, until His trial, publicly claim to be more than this, it is certain that He privately admitted that He was the Christ.

When John the Baptist heard of Jesus's ministry, he sent to inquire whether He was the Messiah, and received an affirmative answer. When Jesus asked His disciples, "Who say ye that I am?" Peter answered, "Thou art the Christ," and Jesus "charged them that they should tell no man of Him." At the trial the high priest asked, "Art Thou the Christ, the Son of the Blessed?" and Jesus said, "I am." When all three statements are considered in connexion with the majestic religious certainty of Jesus, it becomes impossible to doubt His claim to be the Christ.

But, if the conclusions of modern scholars can be trusted, Jesus did not explicitly make greater claims for Himself. The relation to God of the Christ was worked out by His followers, who gradually came to see that He was

the Incarnation of God. Belief in the Resurrection contributed powerfully to this view. Existing accounts of the appearances of Jesus after His death are difficult to understand, partly because the original ending of S. Mark's Gospel has been lost. But there is no doubt that the Apostles were sure that they had seen the Christ.

The Divinity of Christ

S. Paul in later years commonly wrote of the "Lord Jesus Christ." The term "Lord" was applied by pagans to their gods; but the apostle could use it without necessarily implying that Jesus was God. Yet S. Paul was led even more clearly to identify the Spirit of the risen and living Christ with the Spirit of God. When "the grace of the Lord Jesus Christ" is coupled with "the love of God and the fellowship of the Holy Spirit" we have the germ, and probably much more than the germ, of that thought which explained the Incarnation by the doctrine of the Trinity. The Fourth Gospel is now generally regarded as the work of a writer who may have used discourses of the Apostle John, the son of Zebedee, but who certainly was strongly influenced by S. Paul. This writer explains Jesus by saying that the "logos" or Word of God, a pre-existent Being Who from the beginning was with God and was God, "became flesh and dwelt among us." Such is the final Christology of the N.T.

Two particular aspects of modern thought may be mentioned. It has of late been increasingly emphasised that Jesus could not have been perfect man without accepting human limitations. The traditional creeds so strongly insisted upon His Divinity as somewhat to obscure this fact. It is now urged by theologians that He was "very God of very God," but they say that in becoming flesh He necessarily accepted ideas as to history, science, and literature held by His contemporaries.

The Virgin Birth

No finality has, however, been reached as regards the controversy which centres in the Virgin Birth. By uninstructed Christians it is generally thought that the Incarnation is proved by the Virgin Birth, and that those who doubt that miracle cannot, therefore, affirm the Divinity of Christ. This is untrue. If it were a fact that the Incarnation can only be held by those who accept the Virgin Birth, it would be incredible that the miracle is never mentioned in any

extant writings of S. Mark, S. Paul, or S. John. Moreover, if there were conclusive evidence that His mother was a virgin when Jesus was born, and if Jesus had been a commonplace or a bad man, it would obviously be impossible to claim that He was Divine. In short, the miraculous birth at most confirms the fact of the Incarnation.

Theologians who plead to be allowed to suspend judgement as to the manner of Christ's birth point out that the miracle is recorded only in the opening chapters of the first and third Gospels, that these narratives are difficult to harmonise, and that they may possibly have been derived from popular traditions. But it must be observed that doubts as to the truth of the miracle are held in the main by those who accept from modern science the idea that God always works uniformly through nature.

Bibliography. Essays on the Trinity and the Incarnation, ed A. E. J. Rawlinson, 1928; The Incarnate Lord, L. S. Thornton, 1928; Doctrine of the Incarnation, J. K. Morley, 1936; The Divinity of Jesus Christ, J. M. Creed, 1936; The Person of Jesus Christ, A. E. J. Rawlinson, 1943.

Incarvillea. Small genus of perennial herbs of the family Bignoniaceae. Natives of China and Soviet Central Asia, they have opposite, divided leaves, and large, tubular flowers of rosy or scarlet colour. *I. olgae* is frequently grown in European gardens.

Ince-in-Makerfield. An urban dist. of Lancashire, England. It adjoins the co. bor. of Wigan, but has its own railway station. Industries include rly. wagon works, ironworks, cabinet making, garment works, cotton mills, and collieries. Ince gives its name to a county constituency. Pop. (1951) 20,413.

Another Ince is in Cheshire, 7 m. N. of Chester. It has an old manor, now a farmhouse, once the residence of the abbots of S. Werburgh, Chester. Pop. (1951) 509.

Incendiary (Lat. *incendere*, to burn). One who maliciously sets fire to property, especially a building. This is, under most codes of law, a crime, and in England is known as arson and in Scotland as fire-raising. See Arson.

Incendiary Weapons. Bullets, shells, bombs, or other projectiles filled with inflammable materials or chemicals and designed to ignite upon contact with their target. They are distinct from flame weapons (*q.v.*), which consist

of either a flame fed from a reservoir of oil, projected through a nozzle directly at the target (i.e. a flame thrower), or a burning substance thrown or fired against the target (i.e. burning arrows). In the incendiary weapon, the inflammable filling remains inert until combustion is caused by a fuse or by impact.

One of the earliest known uses of incendiary weapons was by the Romans in 250 B.C., during the first Punic War. Earthenware containers filled with chemicals were catapulted against the enemy and ignited on contact with the ground. Early in artillery warfare came a leather or light metal casing, filled with an inflammable liquid, a flint-and-steel or other device igniting the contents when the shell hit the target. Such shells were used in naval warfare to fire ships' rigging. In 1857 the British army adopted a cast-iron shell, lined with loam, and shortly before firing filled with molten cast iron. On impact the case broke up and the molten contents were splashed over the target. In a type invented at the beginning of the 20th century, iron was rendered molten during the passage of the projectile to its target; the shell was provided with either a time or a percussion fuse.

Incendiary Bullet Introduced

The First Great War brought the incendiary bullet designed for use against aircraft. A common type was a cupro-nickel case filled with white phosphorus; when the bullet was fired, friction caused the case to melt, whereupon the phosphorus ignited by exposure. The bullet proved effective when fired into aeroplane petrol tanks or the gasbags of airships. Shells filled with phosphorus or finely powdered iron or magnesium were fired from 4.5-in., 6-in., and 18-pdr. guns; a contact fuse detonated a charge, raising the filling to white heat and scattering it on the target. But greater devastation was wrought by high explosive.

It was the development of the tank and the aeroplane which led to improvement of incendiary weapons in the Second Great War. All the armies employed some form of incendiary anti-tank grenade; in general their design was based on either the Russian self-igniting "Molotov cocktail," first used in the Spanish Civil War, or on the British No. 74 grenade.

The self-igniting grenade was a short-necked half-pint glass bottle, 90 p.c. full of a mixture of yellow

phosphorus, benzene, water, and a 2-in. strip of crude rubber. The remaining space contained air. When thrown against a tank or other armoured vehicle, the glass shattered and the contents of the grenade ignited spontaneously as the oxidised phosphorus fired the benzene. The rubber, which dissolved in the mixture during storage, made the incendiary materials tacky, so that they adhered to the surface against which they spilled. The German Brandflaschen and the Japanese Kaen-Bin were of this type.

Adhesive Grenade

The British No. 74 consisted of a spherical glass or plastic container holding 20 oz. of jellified nitro-glycerine. The container was covered with a woollen jacket steeped in a powerful adhesive. Fixed to the top of the grenade was a wooden Mills handle incorporating a lever in contact with a firing pin. When the safety pin was withdrawn and the grenade thrown, the lever in the handle released the firing pin, which detonated a 5-sec. fuse embedded in the charge. Upon striking its target, the grenade stuck to it, the container was shattered, and the explosive ignited by the fuse.

Several efforts were made to produce an efficient anti-aircraft incendiary, one of the first being the German "flaming onion" (g.v.); this, however, was rather an enlarged tracer bullet, destructive only if the projectile scored a direct hit on the target. The Germans later developed an incendiary A.A. shell, but it proved ineffective.

The incendiary bomb dropped from aircraft developed into the most potent weapon of aerial warfare until the advent of the atomic bomb. In 1939 the standard one used by the R.A.F. weighed 2 lb. 2 oz. Various known as the electron or kilo, shown in the diagram, it consisted of a thin tubular case of magnesium alloy fitted with a composition of thermite A (aluminium iron oxide). During descent the bomb was kept head down by a tail of sheet iron, B. In its head was a detonating pin, C, which upon impact was driven against a percussion cap that in turn fired the igniter, D. As thermite supplies its own oxygen and burns at 3,000° C., the heat fired the magnesium case, which set alight any material except stone, concrete, and steel. The bomb could be extinguished only by smothering it with sand or earth, or

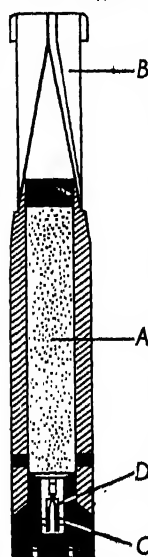
directing against it a spray of water. The Luftwaffe used a similar type of bomb in most attacks on Great Britain, including the fire raid on London, Dec. 29, 1940.

The German air force never equalled the devastating fire raids carried out over Germany by the R.A.F. and the U.S.A.A.F. Japan made comparatively small use of the incendiary, though in the only air raid on the U.S. mainland, Sept. 9, 1942, incendiary bombs from balloons launched from Japan fell harmlessly in an Oregon forest.

The Allied design of incendiary bombs was modified with the object of rendering their extinction difficult or dangerous; an example was the introduction of sodium compounds, which react violently to the application of water. In 1942 a combination of incendiary and anti-personnel bombs was introduced; it could kill anyone who approached within 50 ft. of where it fell. White phosphorus, with the property of igniting spontaneously when exposed to air, was dropped in thin containers which burst on impact. Solidified oils were used as fillers, pieces of burning oil being thrown around upon detonation.

The Scatter and the Intensive

The incendiary bomb most widely used by the Allies in the latter part of the war weighed 10 lb. and was dropped in containers holding 100. At a predetermined height the container opened



Incendiary Weapons. The bomb known as an electron or kilo

and released the bombs individually. There were two main types, the scatter and the intensive. Bombs filled with viscous and gelatinous materials instead of solid combustibles were also used. One semi-liquid filling consisted of petrol thickened with jelly to prolong burning and ensure adherence of the incendiary substance to walls and ceilings. Thickening petrol with magnesium powder, liquid asphalt, and oil yielded an inflammable mixture of intense heat.

It was found that against

towns and industrial targets incendiaries are potentially more destructive than high explosive. The latter is principally an agent of demolition, its effects strictly limited as to both space and time. Incendiaries act cumulatively, inducing self-destruction of material to produce effects that extend far beyond the point of impact. The limitation of the incendiary bomb is that it must bring fire directly to bear upon a combustible object. If the bomb misses the target it will burn itself out, while a direct hit on a fire-resistant target will be innocuous.

Point bombing was made from a low altitude and needed a large incendiary with good penetrating qualities; it was chiefly directed against isolated targets likely to escape destruction during a conflagration. Area incendiary bombing was normally undertaken from a high altitude. In this operation it was usual to drop four tons of incendiaries per square mile over an area known to contain a high proportion of inflammable targets. From 15 p.c. at the beginning of the Second Great War, the quantity of incendiary bombs increased until by 1945 it was not unusual for a R.A.F. bomber force over Germany to carry 80 p.c. of its load in this form. In the air war against Japan the proportion of incendiary to high explosive bombs dropped was much higher than in Europe. On March 9, 1945, 1,000 tons of incendiaries razed over 15 sq. m. of Tokyo. During the war over 100,000 tons of incendiaries destroyed some 150 sq. m. of Japanese industrial areas. See Air Raids; Bomb.

David Le Roi

Incense. Substance which on burning emits a fragrant odour. It has been used from early times in religious ceremonies. Its hygienic value as a fumigant and in counteracting unpleasant smells was also appreciated. Tertullian (c. 200), discussing the use of incense, stated that whilst he appreciated its value in counteracting unpleasant smells he did not accept it as essential in worship. Records of early Egypt show that incense was used probably in the first Thinite dynasty (3,500 B.C.). Ancient Egyptians obtained their frankincense from the Somali coast, where trees of the *Boswellia* genus which produce it are plentiful. It was used all over East Asia.

Apart from frankincense, many other resinous substances are used. Sixteen ingredients are

specified in one Egyptian compound, and the blending was carried out with elaborate ceremonial. Among the Jews the use of incense was strictly confined to the priesthood. The O.T. contains a fairly detailed record of the development of the ritual (Ex. 30; Lev. 10; Num. 16; and 2 Chron. 26). The Romans favoured incense in ceremonies and as a fumigant. In the Christian Church incense does not appear officially until about the 5th century, but was probably used earlier as a fumigant. There appears to be no fixed rule as to the composition and manufacture. Rome uses frankincense (*q.v.*); other places prefer benzoin, sterax, cinnamon, etc.

Trees producing suitable substances are plentiful in tropical Asia and in Polynesia. Gum benzoin from Siam and Sumatra is a typical product. Cheaper incenses are prepared from damar resins and from manila copals in Malaya and Indonesia. Apart from *Boswellia* in Somaliland, suitable trees grow in India, particularly in Bihar and on the slopes of the Himalayas, and Bombay exports incense to Europe.

Incense Cedar (*Libocedrus*). Small genus of evergreen trees of the family Coniferae. They are



Incense Cedar, a tree valuable for its timber

natives of Asia, Australasia, and America. They have small, scale-like, overlapping leaves, much like those of *Thuja*, and oval cones consisting of four to six flatish scales. Some among the species yield valuable timber, *L. tetragona* (Patagonia) being so straight and even-grained that it gives spars and boards of great length, and splits so cleanly that shingles of its wood appear as though they had been planed. *L. doniana* (New Zealand) and *L. chilensis* (Chile) also provide admirable timber; but the wood of *L. bidwilli* (New Zealand) is soft and porous.

Incest (Lat. *in*, not; *castus*, chaste). Carnal knowledge between

a man and one who to his knowledge is his granddaughter, daughter, sister, or mother. It is immaterial whether the relationship is of the whole blood or half blood, or is traced through lawful wedlock. An act of 1908 made incest a crime.

Inch. Form of Celtic word *ennis* or *innis*, an island. The word is commonly found in Scottish place-names, e.g. Inchcape, Inchgarvie, Inchkeith, and Inch Kenneth.

Inch (Lat. *uncia*, a twelfth part). Measure of length. It is the twelfth part of a linear foot. The British halfpenny coin is one inch in diameter. See Weights and Measures.

Inchbald, ELIZABETH (1753-1821). English actress, playwright, and novelist. Born near Bury



Elizabeth Inchbald
After Russell

St. Edmunds, Oct. 15, 1753, daughter of John Simpson, farmer, she married an actor, Joseph Inchbald (d. 1779), in 1772. She acted for a time on the provincial stage, wrote

and adapted plays and farces, and is chiefly remembered as the writer of *A Simple Story*, 1791, and *Nature and Art*, 1796, often reprinted. She died in London, Aug. 1, 1821.

Inchbold, JOHN WILLIAM (1830-88). British painter. Born at Leeds, April 29, 1830, he studied at the R.A. schools. He first exhibited at the Society of British Artists in 1849 and at the R.A. in 1851. John Ruskin's praise of *The Moorland*, 1855, drew attention to his work, which, however, was slow to win general approval. Despite his sympathies with the Pre-Raphaelites, he painted landscape broadly and with intense feeling, his aerial effects and wide horizons being especially fine, but his colouring was uncertain. He died at Headingley, Leeds, Jan. 23, 1888. His volume of verse, *Annus Amoris*, 1877, proved him a poet of merit.

Inchcape, JAMES LYLE MACKAY, 1ST EARL OF (1852-1932). British shipowner and administrator. The son of a shipowner, he was born at Arbroath Sept. 11, 1852. He went to India in 1874 and became partner in a firm of merchants. Chairman of the Bengal chamber of commerce and one of the viceroy's legislative council, he was knighted in 1894

for establishing the gold standard in India. From 1897 he represented commercial interests on the

council of India, negotiating a treaty with China in 1902. Back in England he built up a unique position as a director of the National Provincial Bank, the Anglo-Persian Oil Co., and the G.W.R., and as head until his death of the P. and O. shipping company. He attended the imperial conferences of 1907 and 1911. In the First Great War he disposed of many government and ex-enemy ships at favourable terms for the Treasury. He was made a baron in 1911, a viscount in 1924, and an earl in 1929.

In 1928 his daughter Elsie Mackay was lost on an Atlantic flight, and Inchcape set aside £527,808, which would have been her portion, to accumulate at compound interest for 45 to 50 years, the fund then to be used to reduce the national debt; it was estimated that the sum would amount to £8,500,000. Inchcape died May 23, 1932, and was succeeded in his title and shipping interests by his son Kenneth (1887-1939). The 3rd earl was the latter's son Kenneth (b. Dec. 27, 1917). An eldest son is called Viscount Glenapp. A Life of the 1st earl by H. Bolitho appeared in 1936.

Inchcape Rock. Dangerous reef off the coast of Scotland, called also the Bell Rock. Some 13 m. due E. of Buddon Ness, Angus, at the mouth of the Firth of Tay, it is 500 yds. long and 100 yds. wide. At ordinary tides it is four ft. above the water, but at spring tides it is submerged 12 ft. A lighthouse was built here by Stevenson in 1807, and the light is one of the most brilliant on the British coast.

Formerly a bell tolled by wave action warned the mariner. The rock is the subject of a ballad by Southey.

Inchcolm. Island in the Firth of Forth, Scotland. Belonging to Fife, it is $1\frac{1}{2}$ m. S. of Aberdour; its length is about $\frac{1}{2}$ m. and

extreme breadth $\frac{1}{4}$ m. Here are the remains of a monastery established by Alexander I in 1123, which include a square tower, a church, and small octagonal chapter house, all in good preservation; the stone-roofed oratory to the W. is said to have been a hermit's cell. The name means the island of S. Columba. Saint Colme's Inch is referred to in Shakespeare's *Macbeth*.

Inchgarvie. Island in the Firth of Forth, Scotland, belonging to West Lothian. Its castle, built c. 1491 and at one time used as a state prison, was demolished during the construction of the Forth Bridge, the central support of which rests on the island.

Inchkeith. Island in the Firth of Forth, Scotland, belonging to Fife. It is 4 m. N. of Leith. Acquired by the government from the duke of Buccleuch, it is one of the defences of the Forth. On its highest point is a lighthouse.

Inchon, JINSEN, OR CHEMULPO. Port of S. Korea. It stands on the W. coast, 30 m. by rly. W.S.W. of Seoul. It exports rice, beans, and hides. Pop. 216,000.

Incident (Lat. *in*, upon; *cadere*, to fall). Term usually applied to casual events of minor importance. The Incident is the name specially given to an unsuccessful plot of 1641 whose object was to seize the duke of Hamilton and the earl of Argyll, then leaders of the opposition in Scotland to Charles I.

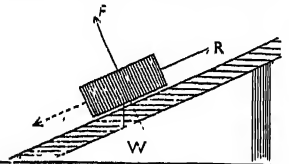
In the feudal system the word incidents was used for the customary payments made to their lords by the holders of land. These are usually classified as reliefs, aids, and rights of wardship and marriage. Reliefs were payments made on succeeding to an estate; aids were paid on special occasions.

The word incident was also used officially during the Second Great War to indicate an area of air-raid damage and the action taken therein.

Incinerator (late Lat. *incinerare*, to reduce to ashes). Furnace in which refuse is consumed by burning. The working of large-

scale incinerators is described under Destructor.

Inclined Plane. Plane surface inclined at an angle to the horizon and in theory one of the simple fundamental machines. Suppose a body to rest on a frictionless plane. The weight of the body *W* acts vertically downwards and this force can be resolved into two components, one acting perpen-



Inclined Plane. Diagram illustrating its mechanical principles

dicular to the surface and the other down the surface. The first of these components is balanced by the reaction *P*, and the force *R* necessary to prevent the body from sliding down the plane must equal the second component. Thus by means of an inclined plane a body can be raised by application of a force only a fraction of its weight.

Inclusion. In mineralogy, any foreign body enclosed within a crystal. Inclusions may be large or small, and gaseous, liquid, or solid. They are due to a variety of causes, the most common being rapid crystallisation, crystallisation from impure solutions, or incomplete replacement. Fluid inclusions are often water, frequently brine; carbon dioxide is common, as gas or liquid. Sometimes liquid inclusions contain a movable bubble of gas. The concentration and nature of inclusions sometimes has a profound effect on the appearance of the host mineral, e.g. milky and smoky quartz.

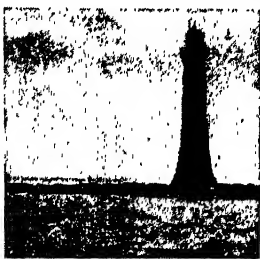
To the metallurgist, inclusions are non-metallic particles which find their way into liquid or solid metals. They may arise from reactions in the liquid metal or during solidification. Inclusions tend to be concentrated towards the tops of ingots and at grain boundaries.



Inchcolm. Ruins of the Augustinian monastery



1st Earl Inchcape
Elliott & Fry



Inchcape Rock. The reef and lighthouse in the Firth of Tay
Valentine

Income Tax. In Great Britain a tax on income was first introduced by William Pitt in 1799 as an extraordinary war measure. It was withdrawn in 1801, but reintroduced during 1803-16 to help meet the cost of the Napoleonic war. A series of deficits compelled Peel to reimpose the tax in 1842, and the repeal of certain import duties followed by the Crimean War prevented its repeal in 1857. Thereafter it remained in force at rates fluctuating from 2d. (1874-76) to 10s. (1941-46) in the £.

From the outset the principle was established that part of an individual's income should be exempt from tax and part should be taxed at a rate lower than the standard rate in force. This concession was never extended to companies which as "legal" persons are liable to income tax on their profits at the standard rate. In 1909 allowances were first introduced for a wife and for children, and in 1918 for a housekeeper and dependent relatives.

In 1920, following the recommendations of a royal commission, the tax system was remodelled. It was then laid down that having regard to personal circumstances, each citizen should contribute equally to the national expenditure. The rate of tax and the extent of the reliefs and allowances vary from year to year, first in accordance with national needs, secondly in an attempt to equate the tax burden more evenly.

To simplify administration the board of Inland Revenue, which is responsible through district inspectors and collectors for the levying and collecting of income tax, has divided income under five main schedules, all of which have special rules. The income assessed under these schedules is briefly as follows:

Schedule "A": tax on the ownership of land, houses, and buildings.

Schedule "B": tax on the occupation of land.

Schedule "C": tax on income arising on certain government stocks (deducted at source).

Schedule "D": Cases i and ii: tax on trades, professions, and vocations.

Case iii: tax on untaxed war loan and other government stock, deposit interest, etc.

Case iv: tax on foreign and colonial securities.

Case v: tax on foreign possessions and pensions.

Case vi: sundry items not included under any other Schedule.

Schedule "E": tax on wages, salaries, and pensions.

Each taxpayer has a main tax district which deals with his tax affairs, and this, if he is working, is where the headquarters of his (or his employer's) business is situated. His other sources of income are dealt with in the tax districts in which they arise, and he may in consequence get a number of assessments under the different schedules. His allowances and reliefs are coordinated internally by the Inland Revenue, and the general practice is to give the allowances and reliefs which are not directly attributable to a particular source of income, first against the earned income, then against unearned income which is not taxed at source, leaving taxed income until last as relief can be given against this source of income only by repayment.

As far as possible tax is assessed on the income arising in the tax year, but to avoid delay in assessments, in some instances, and in particular for businesses and professions, the Inland Revenue take as the basis for assessment a year's profit as shown by the accounts ending within the preceding tax year, and do not insist on the taxpayer's using the government's financial year, which ends on April 5.

A brief study of the various schedules and the special rules governing them may help the taxpayer to understand the basis of the demands for tax which he receives from time to time and enable him to safeguard himself against over-payment through lack of proper coordination of his reliefs and allowances.

Schedule "A." Until 1939 every property was revalued every five years, and tax was assessed for the next five years on this valuation. This was based on the rent which would have been received if the house had been let, the landlord paying the repairs, and the tenant the occupiers' rates. From this gross annual value was deducted an allowance to cover the cost of repairs, leaving tax payable on the net annual value.

During 1939-57 no revaluation was completed and rents had risen steeply. The government therefore took powers to assess the excess rents over the 1939 valuation, and tax became payable on these excess rents where the property was let.

When the cost of repairing property exceeds, on a five year average, the repairs allowance, the

excess cost may be deducted from the net annual value. The cost of repairs in excess of the N.A.V. cannot be recovered against any other income.

Schedule "B." Farmers were formerly assessed on the value of the land occupied, but during the Second World War they became liable in the same way as businessmen on their profits under Schedule "D." Schedule "B" thereafter covered only uncultivated land, parkland, etc., in excess of one acre round a house.

Schedule "C." Tax is deducted by the paying agent from interest arising on certain government stocks, and the tax is assessable on the agent under this schedule.

Schedule "D." This is a large and comprehensive schedule:

Cases i and ii deal with profits arising from trades, professions, and occupations, and include individual partners and companies. The basis of assessment is the annual accounts of the business, adjusted where necessary to exclude capital items such as the purchase of a motor car, or some machinery, the personal expenditure of the proprietor; and also to exclude capital receipts, such as a legacy, or the sale of some property. Allowances for the depreciation of capital assets used by the business are allowed at special rates worked out by the Inland Revenue; and special allowances called balancing charges are given when plant and machinery are replaced through obsolescence during their working life. These are called capital allowances.

Losses incurred by one business may be set off against profits arising in another, or may be carried forward for six years and set off against future profit arising within the period. Capital allowances can similarly be carried forward if the profit for the year is insufficient to cover them or a loss has been incurred.

In the first and last year of a business the actual profit arising is the basis of assessment; otherwise the preceding year basis is used, with certain safeguards on the second and third years to prevent undue hardship.

Case iii. As a way of encouraging foreign investment, the government issued war loan during the First Great War from which tax was not deducted at source. In the Second Great War defence bonds were issued on the same basis. The

interest arising on these securities and on ordinary and savings bank interest is taxed under Schedule "D," case iii, and except for the first and last years when the actual income is used, the preceding year basis of assessment is adopted.

Cases iv and v deal similarly with foreign and colonial securities, including pensions.

Case vi is the schedule under which tax is assessed on casual profits, income from letting furnished houses, excess rents, etc., and the basis of assessment is the amount actually arising in the tax year.

Schedule "E." Until the Second Great War, tax on salaries and other emoluments was based on the preceding year's income and paid half-yearly in January and July. P.A.Y.E., "pay-as-you-earn," was introduced in 1944-45, a method by which tax on earned income is assessed and deducted at source. Each taxpayer is given a code number based on the allowances to which he is entitled, and the employer by reference to official tax tables knows what to deduct at the time of payment, and hands over the amount collected to the Inland Revenue monthly. At the end of the tax year the taxpayer is reassessed, any over-deductions are refunded, any under-deductions carried forward and collected in the following tax year.

The assessment and collection of tax is arranged by the Inland Revenue in the following way:

In April each taxpayer receives a return form with a request that it shall be completed and sent to his local inspector of taxes within twenty-one days. He also receives a P.60 employer's certificate of pay and tax deductions from his employer, or knows the figure he has agreed as his business profit with the Inland Revenue. These figures must be entered on the form, followed in the appropriate places by untaxed interest (war loan, bank interest, etc.), dividends from which tax is deducted, the N.A.V. of property less maintenance reliefs, free-lance earnings, excess rents, income from furnished letting, family allowances, etc.

On the next page charges on income, such as mortgages and building society interest, and payments under deed of covenant, are entered. Then follows the claim for personal allowances, starting with national insurance contributions, the married man's allowance (name of wife required), children's allowances, housekeeper, and

daughter's services; and a note of life insurance premiums paid by the taxpayer or his wife.

The inspector of taxes will check this return with information received from employers about salaries, banks about interest, etc., and will adjust current code numbers and prepare assessments showing tax over or under paid. Any change in personal circumstances such as the birth of a child or marriage should be immediately notified to the Inland Revenue so that relief can be given.

Taxpayers under Schedule "D" who do not pay tax by deduction receive their notice of assessment in Nov., and this is followed by a demand for tax which is payable in Jan. and July each year.

Schedule "A" notices are also issued in the autumn giving details of tax due in January.

Where a taxpayer's total income comes from investments which are taxed at source, a repayment claim is necessary in order to give effect to personal and other allowances. These are prepared and submitted as soon as possible after April 5 in each year, and can also be submitted half yearly in October and April.

Most countries have adopted some form of income tax, and many governments have entered into agreements by which a national of one country resident in another shall not be doubly taxed, and by which a taxpayer having income arising in another country shall pay tax on it once only. The first arrangements of this kind were made within the British Commonwealth; then in 1946 a double taxation agreement was made by the U.S.A., Canada, and Southern Rhodesia, in 1947 by France, South Africa, and Australia. By 1957 more than 40 such agreements existed; they exempted income earned in a foreign country from tax in that country, and also allowed dividends to be relieved of double tax. Each agreement varied slightly in detail. Consult *Income Tax Law and Practice*, Newport, latest available edition; *Simon's Income Tax*, 2nd ed., 1952; *Tolley's Income Tax Chart Manual* and *Willen's Tax Tables*, issued annually.

D. M. Vaughan, F.C.A.

Incommensurable Quantities.

Quantities or magnitudes which have no common measure definitely determinable. Thus the circumference of a circle is incommensurable with its diameter, because the ratio of the two measurements is a magnitude usually indicated by π

which cannot be precisely determined.

Increment. Word meaning an increase, an amount added. Thus a salary scale may provide annual increments of £25; a house purchased for £1,300 may be sold for £2,000, yielding an increment of £700. The word in mathematics denotes the amount by which a variable is increased or changed; thus, a measureable increase in the quantity x may be represented by the symbol Δx (read as delta x); if the increase becomes indefinitely small it may be represented by the symbol dx (read as dee x).

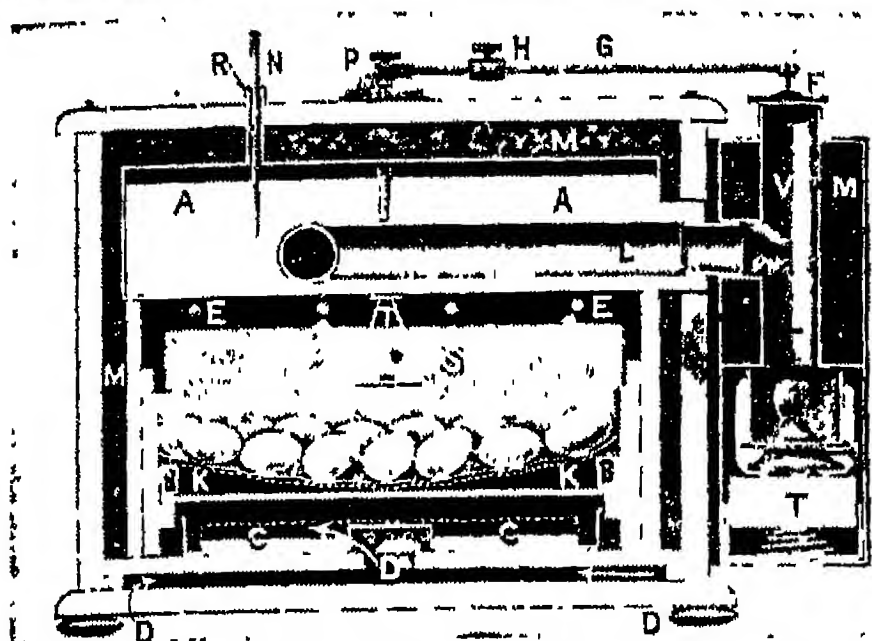
Unearned increment is an additional value that may attach to property merely through a change of circumstances or the lapse of time. Land originally bought for a small sum as agricultural land may after the construction of a main road become valuable as a site for shops, houses, or factories.

Since the publication of Henry George's *Progress and Poverty*, 1879, various methods have been suggested of enabling the community and not the private individual to benefit from this increase in value. Under the Town and Country Planning Act, 1947, all rights of developing land or buildings were transferred to the state. A sum of £300,000,000 was set aside to compensate owners for this loss. Before land or buildings can be developed permission must be obtained and in most instances a development charge must be paid.

Incubation. (Lat. *incubare*, to sit upon or brood). Natural process by which birds stimulate by warmth from their bodies the activity of the germ in the eggs and its continued development until the chick is ready for hatching. The process is not entirely restricted to birds, the duck-bill among mammals laying and incubating its eggs; and among insects the earwig and a tree-bug appear to brood.

The incubation of chickens by artificial means became common in the 20th century. The eggs are placed in a well-ventilated box and kept at the requisite temperature by a current of warm air, or other appropriate means. Several forms of commercial incubator are on the market, but their principle is the same.

Incubators should have a temperature of 103° F. before eggs are placed inside. Correct moisture content of air is 55 p.c. Eggs must be placed evenly, each marked X on one side and O on the other. Eggs should remain



Incubation. Incubator for hatching hens' eggs. A, tank of water; B, egg tray; C, water tray; D, holes for fresh air; E, ventilating holes; F, damper; G, lever; H, lead weight; K, slips of wood; L, chimney and flue; M, non-conducting material; N, thermometer; O, needle for communicating the expansion of S to the lever G; P, middle-head screw; R, filling tube; S, thermostatic capsule; T, lamp; V, chimney

Hearson's Egg Incubator, by courtesy of Spratt's Patent, Ltd.

undisturbed for two days, and thereafter turned three times daily. After 18 days they should be left alone until chicks are hatched. On seventh and fourteenth days eggs should be tested and non-fertiles removed. Incubators must rest firmly and jarring or shaking must be prevented.

HOSPITALS. The principle is now generally applied to the rearing of infants of premature birth, or such as are considered to have little chance of survival under the usual conditions. The child is laid in a basket-bed in a closed chamber air-conditioned at the optimum temperature.

In bacteriological laboratories a somewhat similar method is used to keep cultures under observation at the most favourable temperature.

Incubation Period. In medicine, the time which elapses between the entry of a bacillus or virus into the body and the development of the disease it causes. The following are usual:

Chickenpox: 11-23 days (usually about 14 days).

Common cold: 12-48 hours.

Diphtheria: 2-6 days.

German measles: 14-21 days (usually 17 or 18 days).

Influenza: 24-48 hours.

Measles: 7-21 days (usually about 14 days).

Mumps: 14-35 days (usually about 21 days).

Scarlet fever: 2-4 days.

Smallpox: 10-14 days.

Typhoid fever: 5-21 days (usually 10-14 days).

Whooping cough: 13-15 days.

Incumbent (Lat. *incumbere*, to rest on, remain in). One who holds an ecclesiastical benefice. Institution to a benefice involving the cure of souls is for life. An incumbent can be deprived only for grave offences against ecclesiastical

officiating in his parish. He is ex-officio chairman of all vestry meetings, and responsible for the registers of baptisms, marriages, and burials.

Incumbrance (late Lat. *combrus*, obstacle). English legal term. It means a burden attached to any property in such a way that into whosoever hands the property comes the burden remains attached. Thus mortgages, liens, charges are incumbrances, and there is no limit to them. A person making an agreement to sell property impliedly promises to sell it free from incumbrances, and if any are discovered before the conveyance, he must clear them off before conveying.

Incunabula (Lat., cradle, birth-place). Name given to early printed books, more specifically those printed before 1500; hence, generally, books belonging to the infancy of the art of printing. See Book; Printing.

Indecency. Various offences against English law. The principal are indecent assault; indecent exposure of the person; selling or procuring for sale or exposing for sale indecent books or prints.

Indemnity (Lat. *in*, not; *damnum*, loss). Legally, an undertaking to make good monetary loss or damage. Contracts to indemnify persons against possible loss are frequently made in business circles, fire insurance policies being of this nature. An Act of Indemnity can be passed to relieve persons who have unwittingly broken the law from the penalties incurred. There have been many in English history: e.g. in 1920, one granting indemnity to those who had carried out duties for the purpose of maintaining order and discipline during the First Great

or moral law, such as simony, heresy, demanding payment for the Sacraments, conviction for felony, or adultery. On the other hand, he can relinquish his charge only by resignation subject to the permission of the bishop of the diocese. He possesses a life freehold of the glebe and other properties of the living, and can prevent by legal process any other clergyman from

War. Another protected officials who had exceeded their powers in Ireland during the "troubles."

A war indemnity is the money paid by a country after the conclusion of a war to its victorious opponent or opponents, ostensibly as compensation for the damage done. After the Franco-Prussian War, Germany in 1871 demanded an indemnity of £200,000,000 from France. The treaty of Versailles in 1919 required a large sum to be paid by the Germans to the Allies, and this was fixed in 1921 at £11,300,000,000, to be paid over 42 years; a duty of 12 p.c. on all German exports was to be levied for the same period. The Germans later declaring themselves unable to pay, the amount was reduced to £6,600,000,000. After the Second Great War Finland, Italy, Hungary, Bulgaria, and Rumania, under treaties signed in 1947, agreed to pay indemnities ranging from \$300,000,000 each by Finland and Rumania to the U.S.S.R. to \$5,000,000 by Italy to Albania.

Indene (C₉H₈). A hydrocarbon which occurs in coal-tar. It is separated from crude benzene by means of picric acid. Indene is a colourless, oily liquid which on oxidation with nitric acid is converted into phthalic acid.

Indent (late Lat. *indentare*, to notch). In commercial language, an order for goods given by an agent abroad, including full particulars about price, etc. Such orders were formerly written on forms in a zigzag or indented fashion from a counterfoil, hence the name. The object was to prevent forgery, but speedier means of spreading commercial information have made it less necessary, and indents are now merely orders for goods. See Invoice.

Indented. In heraldry, a line of demarcation, similar to dancetté (*q.v.*), but smaller. In typography, an indented line is one not set fully to the left-hand margin, e.g. the first line of a paragraph.

Indenture. Term of English law. Formerly, when a deed was entered into between two parties it was written in duplicate upon one piece of parchment, and then the two parts were severed so as to leave an indented or wavy edge, forging being thus rendered difficult. The practice has long since ceased, but still a deed made between two or more parties, e.g. a vendor and a purchaser, always begins with the words "this indenture." A deed made by one party, e.g. a power of attorney, is called a deed poll, because formerly instead

of an indented edge it had a polled or clean-shaven edge.

Independence. City of Kansas, U.S.A., the co. seat of Montgomery co. It stands on the Verdigris and Elk rivers, 160 m. S.S.W. of Kansas City, and is served by rlys. Situated in an agricultural, natural gas, and oil region, it is the headquarters of several oil companies, manufactures oil well equipment, washing machines, revolving doors, alfalfa meal, glass, asphalt, and Portland cement and has flour, cotton, and paper mills, ironworks, and machine shops. It became a city in 1872. Pop. (1950) 11,335.

Independence. A city of Missouri, U.S.A. It stands just E. of Kansas City and is a co. seat of Jackson co. Largely a residential district for business men, it is served by the Missouri Pacific and other rlys. President Truman passed his boyhood here. The city makes steel, harvester combines, stoves, petroleum products, and Portland cement, and engages in flour milling, fruit canning, and oil refining. Settled in 1827, it became a city in the gold rush year 1849. It was a point of departure for wagon trains for Oregon and California and for the first overland mail coach to the West. Joseph Smith and 1,500 Mormons or Latter Day Saints established here their New Jerusalem, 1831-39. In 1867-69 Mormons from Utah settled here, and remain the largest religious group in the city. Pop. (1950) 39,963.

Independence Day. A legal holiday observed annually throughout the U.S.A. on July 4 in commemoration of the adoption of the Declaration of Independence by the second Continental Congress on that date in 1776. It is more commonly known as "the Fourth." As a popular holiday, it is kept e.g. by excursions to the seaside. As an historic commemoration, it is celebrated by special services in churches, parades, and functions at which

patriotic orations are delivered. Fireworks are let off on a scale far exceeding anything known in England on Guy Fawkes' Day. An investigation in 1930 showed that during the previous 30 years firework accidents on the Fourth had caused the death of more Americans than the War of the Revolution itself. See Declaration of Independence.

Independent Labour Party. British Socialist organization. It was inaugurated at Bradford, Jan. 13, 1893 to make the trade unions of Great Britain and the Socialist parties (I.L.P., Social Democratic Federation, and Fabians) a distinct body for securing direct Labour and Socialist parliamentary representation. One of its objects was to secure common ownership of the means of life. Its leader was James Keir Hardie, the secretary being J. Ramsay MacDonald. It remained a small but influential left wing of the growing British Socialist movement after the formation of the Labour party in 1906, reaching its peak in 1923-24 when MacDonald became prime minister of the first Labour government and Philip Snowden, another member, was chancellor of the exchequer. The I.L.P. was against both Great Wars, taking the view that they were waged in the interests of capitalism and imperialism. James Macton virtually led the party from 1926 until his death in 1946. His successor, J. Carmichael,

last remaining member of the I.L.P. in the house of commons, joined the Labour party in 1947.

Independents. Name given to a religious body in Great Britain and the U.S.A., better known as Congregationalists. See Congregationalism.

Independent Television Authority. Body set up in England under the Television Act of 1954 to provide a broadcast television service independent of the B.B.C. and financed by advertising revenue. Sir Kenneth Clark (q.v.) was appointed chairman at a salary of £3,000 a year; there were also a vice-chairman (£1,000 a year), and eight other members (£500 a year each). A director-general, Sir Robert Fraser, was appointed in Sept., and the service was inaugurated on Sept. 22, 1955. Run at a loss in its first year, it began to make a profit in its second.

Indeterminate Form. Mathematical function which may have an indefinite number of values for a particular value of the variable. Thus $(x^2 - 4)/(x - 2)$ is indeterminate when $x = 2$, for then it becomes $0/0$. Similarly other functions may reduce to ∞/∞ , $0 \times \infty$, $\infty - \infty$, 0^0 , ∞^0 , or 0^∞ for some particular value $x = a$. Limiting values as x approaches a can often be found by reducing the function to a form which yields $0/0$ and differentiating numerator and denominator.

Index (Lat.) List, digest, or analytical analysis of a book. It should be systematically alphabetical and bring together all the items on a kindred subject.

The word index, used by Cicero in the sense of syllabus, has come into general use in English since the latter part of the 17th century, before which such words as pye or pic (from the Greek word *pinax*, meaning register or list), calendar, catalogue, inventory, register, summary, table, and syllabus are found. Notable indexes are those by H. B. Wheatley to Pepys's Diary; Dr. Birkbeck Hill, to Boswell's Life of Johnson, Boswell's Letters, and the Johnson Miscellanies; J. W. Wheeler, to The Spectator; the various indexes to The Times; and those to the journals of the house of commons, the calendars of state papers, parliamentary papers, and the statutes of the realm. Indexes are provided to the transactions of learned societies; and some library catalogues have subject indexes.

Index. In engineering, anything used or designed to guide or point out, like the pointer of an astronomical instrument, or the

Independence. Facsimile of the signatures appended to the Declaration of American Independence, Aug. 2, 1776

hand of a clock. In surveying, an index is a brass rule accompanying a plane table and having at each end sight vanes. The surveying term index error is applied to a theodolite in which the line of sight to a fixed object is truly horizontal but the vertical circle does not read zero; the angle thus registered is the index error of the instrument. In a watch, the index is the small lever controlling the balance spring, by which the rate of movement of the watch can be adjusted.

Index. In mathematics, a symbol denoting the power to which a quantity has been raised. *See* Indices.

Indexing. A good index is a necessary corollary to a good book. The art is of comparatively modern growth. The earliest attempt at indexing a book took the form of an abstract of contents in the order of the book itself. Adherence to strict alphabetisation was a later development.

In making an index the articles A, An, and The are ignored, except in an index of first lines of verse. Persons with surnames should be indexed under them and not under their first names. Classification should be used sparingly, and should be alphabetised.

Abbreviations, *e.g.* St. for saint, should be indexed as if spelt out. The same person should not be referred to under different names (though cross-references may be useful). Considerable care is required in dealing with entries of foreign names (*see, e.g.*, the article De in this Encyclopedia).

The use of dashes (—) to avoid repetition of the opening words of an entry has dangers, as in the notorious example of

Mill on Liberty
— on the Floss
or the equally misleading
Lead Kindly Light
— Poisoning

Each class of index has its peculiar problems. The indexing of library catalogues, where the aim is the bringing together of books on kindred subjects, is made specially difficult by the fact that titles of books are not always certain guides to their contents. If the indexed page is large, it should be divided into lettered sections, as in the index to the Oxford Book of Quotations; or, as in The Times newspaper index, in which each column is given a letter.

When the work to be indexed is in several volumes, it is advantageous if the volume reference is in

Roman numerals, the page reference in Arabic figures.

Index Librorum Prohibitorum (Lat., list of prohibited books). Catalogue of books the reading of which by the faithful is prohibited in the R.C. Church. This right of prohibition was claimed in 398 by a council of Carthage, and a list of banned works was issued in Rome by Pope Gelasius in 494. The first important catalogue was produced by the council of Trent and published by Pius IV in 1557–59. The Index was republished by Clement VIII in 1595, since which date various new editions have appeared. It is the work of the Congregation of the Index, reorganized by Benedict XIV in 1753.

Index Number. Statistical term for a number representing a measure (or measures) standardised by reference to another measure (or measures) represented by the number 100. For instance, a price of 6s. standardised by reference to a price of 5s., represented by 100, would have an index of 120 ($100 \times \frac{6}{5} = 120$).

Generally index numbers relating to several different times or places are calculated with reference to one "base" of 100 so that they may all be compared.

The term normally refers to a number representing the average of several measures. If the price of one make of gloves rose from 5s. to 6s., and of another make from 10s. to 11s., an index number of the price of gloves in the second period would be the simple average of the individual index numbers (usually called "relatives"), *i.e.* $\frac{120 + 110}{2} = 115$. This implies

that both makes of gloves are of equal importance. If they are not of equal importance (usually as measured by the amount of money spent on them) a weighted average is required. If £2 is spent on the first make and £8 on the second, the index number for the second period becomes

$$\frac{(120 \times 2) + (110 \times 8)}{2 + 8} = \frac{240 + 880}{10} = 112$$

In general, with different price changes for different commodities, the relative importance of the commodities will also change. The weights used in the index number then become a matter for choice and may lead to different values for index numbers representing the same things.

The average used in the calculation of an index number need not be the arithmetic average used in this example. Another form of average (*see* Average) could be used and might give yet another value. The geometric mean was used in the past but gave way almost entirely to the arithmetic mean, which is easier to calculate and to understand.

Index numbers most commonly relate to concepts which cannot themselves be measured and are most used in the field of economics. For instance, index numbers of large numbers of price changes may be used as measures of the cost of living (*q.v.*), the general price level, and so the purchasing power of money. Index numbers of a large number of quantity changes are used to measure the volume of production and changes in real income. An index of prices of imported goods divided by an index of prices of exported goods measures the term of trade. Index numbers are also used in comparing birth rates and death rates in order to eliminate the effects of age distribution.

Historically index numbers were first used in 1764 by an Italian, Carli, who wanted to measure the purchasing power of money. W. S. Jevons, Edgeworth, Alfred Marshall, and Irving Fisher developed the use of index numbers in this connexion. After the First Great War attention was also given to the use of index numbers for the measurement of quantity changes. The use of index numbers to give a unique measure of a very broad concept (such as the value of money) was increasingly criticised, and emphasis changed to the use of more index numbers each of limited scope and designed to fulfil a particular purpose.

An official index of retail prices in the United Kingdom goes back to 1892, of wage rates to 1874. Official index numbers of wholesale prices have been published since 1902 and of industrial production since 1928. Government publication of index numbers extended greatly after the Second Great War. Official (and some non-official) index numbers are published in the Monthly Digest of Statistics and the Annual Abstract of Statistics (H.M.S.O.).

Indices for most countries are published in the Monthly Bulletin of Statistics and the Statistical Yearbooks issued by the United Nations Statistical Office in New York.

INDIA: SOUTHERN SUB-CONTINENT OF ASIA

D. L. MATTHEWS, B.A., F.L.A., authority on India

This article is concerned with the whole sub-continent of Asia known historically as India. The sub-continent is treated as a single entity geographically, and also historically down to the separation of British India into the dominions of India and Pakistan in 1947. (For the later history of those countries, see India, Union of, and Pakistan.) See also shorter articles on the states, historic and existing, the cities, rivers, mountains, peoples, and religions of India

The sub-continent of India occupies the centre of the southern part of Asia; it is entirely north of the equator and partly within the tropics. Its total area is 1,581,410 sq. m. and it comprises the republics of India and Pakistan, the unassigned state of Kashmir, and three small Portuguese territories. Its rough shape is that of a quadrilateral with curved sides. The N.W. boundary is the long chain of mts. separating it from Afghanistan and Persia. The long sweep of the Himalayas, the highest mountain range in the world, protects its N. and N.E. side; then twists S. to form the mountainous boundary between Assam and Burma. The pear-shaped peninsula of India, which extends southwards into the Indian Ocean, has the Arabian Sea to the W. and the Bay of Bengal to the E. Off the S.E. tip of India lies the island of Ceylon.

Along the northern boundary of the sub-continent lie the Himalaya states of Sikkim, Bhutan, and Nepal, and beyond again Tibet, which shares a common frontier with India. The Andaman and Nicobar islands in the Bay of Bengal form part of the republic of India.

Division into Regions

PHYSICAL FEATURES. The Indian sub-continent falls into three clearly defined regions: (a) the mountain systems of the northern boundaries; (b) the Indo-Gangetic plain; (c) peninsular India, most of which is a plateau. The northern mountains themselves form three great systems, dominated by the formidable chain of the Himalayas, running from N. Assam in the N.E. to Kashmir, the northern apex of the sub-continent and lying, geographically, beyond the main Himalayan chain proper. S.W. of Kashmir is the complex of mountain ranges forming the N.W. line of the sub-continent, generally higher in the N., in the E. Hindu Kush, where peaks exceed 20,000 ft., and diminishing in altitude in the ranges towards the Baluchistan coast of the Arabian Sea. Quetta, on the Pakistan side of the Afghanistan frontier, lies at an altitude of 5,500 ft.

In Himalayan Tibet, W. of Nepal, within a circle of some 100 m. radius, rise five of the great rivers of the sub-continent, the Sutlej, Indus, Brahmaputra, Ganges, and Jumna. The southern extension of the eastern Himalayas, forming the Burma frontier, is somewhat lower, though virtually impassable except for short periods on one or two routes. These ranges have different names in different areas: the Pathai, Naga, Khasi, and Garo Hills.

Principal Rivers

The great alluvial north-central plain, formed as the geological fore-deep of the Himalayas, is watered by the S.W.-flowing Indus and its tributaries on the one hand, and on the other by the E.-flowing Ganges. The plain extends for some 1,500 m. between the two halves of Pakistan. The Punjab, which forms its N.W. extremity, takes its name from the 5 rivers which water it: the Jhelum, Ravi, Chenab, Sutlej, and Beas, flowing S.W. to join the Indus which debouches into the Gulf of Cutch.

Peninsular India is divided from the great plain by numerous ranges of comparatively low hills: the Aravali range, terminating in the N. in the famous Delhi Ridge; the Vindhya; Satpura; Malkal; and Rajmahal ranges. In the W. Aravalis is Mt. Abu, 5,650 ft.; to the S. of the range a confused hill system merges into the Western Ghats which themselves form the high W. coastal range of peninsular India. With occasional peaks of 9,000 ft., and an average height of 3,000-4,000 ft., the Western Ghats are the escarpment side of a vast plateau and rise suddenly from the Arabian Sea. The Eastern Ghats towards the E. coast are much lower (average 1,500-3,000 ft.) and merge into a coastal plain flanking the Bay of Bengal. Between the two ranges the E.-sloping tableland of the Deccan forms a rocky, uneven plateau. In the S. lies the Mysore Plateau, and S. of this again the Nilgiri Hills, reaching over 8,000 ft. (Mt. Dodabetta 8,760 ft.) and the Cardamon Hills of Kerala.

Most of the rivers of the plateau run eastward, but the Narbada and the Tapi reach the Arabian

Sea in a westerly course through the Western Ghats. In Rajasthan the Chambal flows N. to join the Jumna, as do the Betwa and Ken farther E.; the Son and Barakar also run N. as tributaries to the Ganges. The main rivers of the Eastern Ghats are (from N. to S.) the Mahanadi, Godavari, Kistna (or Krishna), the two Pennars, and the Cauvery, all running E. to the Bay of Bengal.

CLIMATE. Most of peninsular India lies within the tropics, but the whole of the N. sub-continent, including the vast Indo-Gangetic plain, is outside, and a variety of climates is found, of which the monsoon-tropical is dominant. Generally speaking the seasons are three: cool (October to February); hot (March-June); which culminates in the wet (end of June to September).

Rhythm of the Monsoons

The period of the N.E. monsoon is first marked by cool weather, and then by the hot dry season, lasting until June (later in the W.) when the wet S.W. monsoon arrives, to last until Sept. The retreating monsoon in Oct.-Dec. again brings cooler weather. Cool season temperatures vary greatly from N. to S. and from E. to W. Slight frosts may occur at night in the Punjab (N.W.) while the daily average in Madras (S.E.) is 75° F. In April-May, with the sun overhead, temperatures often exceed 110° F. in the N.W., and 90° F. in the Ganges delta.

The advent of the wet monsoon in June brings some relief from the heat, but the torrential rains are often accompanied by thunderstorms, and temperatures again become uncomfortably high. The highest rainfalls in the world are recorded in the hills of the N.E. during the wet season: the yearly average at Darjeeling is 126 ins., and Cherpunji, the wettest place on the globe, in 1861 recorded 900 ins. and has an annual average of 400 ins. In the Ganges delta the rainfall is much less (Calcutta has an annual average of 63 ins.) and there is a gradual decrease N.W. as the wet monsoon becomes less and less laden with moisture. The Thar desert receives only about 4 ins. a year. The W. coast of the

peninsula receives a heavy precipitation due to the effect of the Western Ghats on the wet S.W. monsoon: Bombay has a yearly average of 86 ins.; and some places on this coast receive over 200 ins. Southern India is a good deal drier, and the farther S. the less marked becomes the difference between summer and winter. In the S.E., winter rains accompany a N.E. monsoon during Oct. to Dec. The greater part of India is critically dependent on the rains, and their absence means a disastrous failure of crops and has occasioned tragic famines.

HISTORY. Of early man in India hardly anything is known, although traces of Palaeolithic and Neolithic cultures have been found in widely separated parts of the sub-continent. It seems that Dravidian was the main prehistoric language, and some authorities hold that the great Indus civilization, which flourished between 3000 and 1500 B.C., was Dravidian, although the origins of these Indus peoples are open to conjecture. The sites of these civilizations, which have been excavated at Mohenjo-daro (Sind), Harappa (Punjab), and elsewhere in Punjab and in Rajasthan, reveal a remarkable culture, with well-planned cities and evidence of advanced material prosperity. Certain affinities with the Tigris-Euphrates valley civilization indicate at least trade-relations between the two areas. Life was highly organized socially; these people were skilled in the manufacture of pottery, cotton fabrics, copper and bronze jewelry, in carpentry, and in building. The commerce of the cities was evidently considerable. Wheat, barley, and cotton were cultivated and animals domesticated. Many beautiful examples of the plastic arts of these people have been found, and they also left behind a pictorial script which has so far defied attempts at decipherment.

Aryan Invasion

The Aryan invasions from the N. were probably responsible for the crushing of the Indus peoples, perhaps after the desiccation of the valley following climatic changes and faulty cultivation had weakened their position. The first Aryan wave into the Punjab probably arrived before 1000 B.C., to be succeeded by others which followed the line of the Ganges. By about 600 B.C. the northern invaders had reached the extreme southern tip of India, intermarry-

ing with the indigenous Dravidians, but generally rolling them back southwards. The Rig-Veda, a collection of hymns dating from before 1000 B.C., gives an account of this early Aryan society. The rajan or king was the ruler of a tribal patriarchal society; women held high positions and were much honoured.

The later Vedas and the Upanishads date from c. 1000 B.C., by which time the Aryans were widely settled over the whole of the N. The Hindu religion dominated these peoples, with rules of caste to some extent restricting a complete blending with the original inhabitants. The later epics, Mahabharata and Ramayana, which record the story of the conquests, and the code of Manu, describing the social, religious, and political organization, were compiled when Brahmanism had become fully established. The caste system is fully described, the three castes of "twice-born"—Brahmans (priestly caste), Kshatriyas or Rajputs (warrior caste), and Vaisyas (agricultural, commercial, and artisan caste)—belonging to the conquerors, while the remainder, the conquered, formed the fourth caste. The three castes are separated from each other by marriage-prohibition; their separation from the fourth caste of Sudras (menials) is even more rigid.

Rise of Jainism and Buddhism

During the first stages of the conquest the system was clearly less defined as the peoples became much mixed, with crossing of castes and consequent multiplication of sub-divisions within the system. The Brahmans sought to establish their own ascendancy by the development of the religious sanctity of the whole system, until penalties for breach of caste became terrible to the Hindu. The reaction against Brahmanism expressed itself in two new faiths: Jainism, developed by Mahavira; and Buddhism, founded by his contemporary Prince Gautama. While accepting many of the basic doctrines of Hinduism, both rejected much, Mahavira teaching a strict asceticism and extreme non-violence, and Gautama preaching a code of religious and moral concepts based on the doctrine of the "middle way."

After a short-lived conquest of some of the Indus territories by the Persian king Darius I in 518 B.C., the next notable invasion of India was in 326 B.C., when Alexander the Great reached the

Hyphasis (r. Beas), only to be forced to turn back by way of the Indus when his European troops refused to go farther. This time, too, saw the rise of a new indigenous power, the Nanda empire in the Ganges valley; but national power found its first great leader in Chandragupta, who supplanted the Nanda king in 321 B.C. and founded the Maurya dynasty, extending his empire over the whole of the N. His grandson, Asoka, renowned for his wisdom and virtue, adopted Buddhism, which under his patronage and encouragement became the dominant religion of northern India. After the death of Asoka, c. 228 B.C., a succession of weak rulers led once more to the break-up of the empire, but these centuries witnessed a further mingling of the peoples of India.

Early Contacts with Europe

Intermittent contact with Europe during this period was maintained across the mountains of the N.W., leading to the acceptance of new ideas. It was probably in the 1st century A.D. that Christian missionaries first reached India, and the Syrian Church of Malabar was founded soon after.

The confused aspect of the political scene is in large measure due to the scarcity of contemporary records, which are chiefly epigraphic inscriptions. In the 4th century A.D. the rise of the Gupta dynasty was accompanied by flourishing schools of poets, artists, sculptors, and builders, and the final editing of the epics Mahabharata and Ramayana was probably carried out by Gupta scholars as well as the collecting of a large part of the Puranas. In S. India a number of separate dynasties ruled in the Deccan region, and the Chalukya Rajputs, of whom comparatively a good deal is known, flourished despite the pressure of surrounding rivals. The most notable ruler of this line was Pulakesin II (A.D. 608-642); but the kingdom lasted for some four centuries after his death.

Several Chinese travelling pilgrims who journeyed about the sub-continent in search of sacred Buddhist places have left valuable accounts of the India of their time: in particular, Fa-hien (399-413) wrote about the Gupta period; and Hiuen Tsang (629-645), who travelled over most of India and Ceylon, left vigorous accounts of the contemporary scene.

The Rajput power, which began in the late 8th century, lasted until

the advent of the Arab invaders, against whom it provided the main resistance.

The Arabs first invaded Sind in 711, but were stopped by the Hindu Rajputs, and it was not until the second Muslim invasion, towards the close of the 10th century, that Muslim rule began to establish itself in N. India. The death blow to the Rajput resistance was dealt by Mahmud of Ghazni in his defeat of Jaipal at Peshawar in 1001. During 1176-1206 Muhammed Ghorī (Shahab-ud-din) began the conquest of the Punjab and the upper Ganges, and with his supporting armies of Turks and Afghans began in earnest the Muslim settlement of India. At his death in 1206 his successor Qut-ud-din became the first of India's Muslim rulers.

The relations between the Muslims and the Hindus were highly intolerant, with the two religions mutually hateful as outcasts or idolatrous, and the century following saw the consolidation of the Muslims as the ruling class. Delhi (or, occasionally, a nearby city) was the ruling capital for a number of dynasties: the Slaves, the Khiljis, the Tughlaqs, the Saiyids, the Lodhis, and the Pathans (who were really Turks). The sultanate of Delhi was by no means a tranquil period, and the throne made a precarious seat; nor was the empire in any proper sense unified.

Mongol Invasions

The first of periodic Mongol invasions of N. India were those of Jenghiz Khan in 1221 and Tamerlane (or Timur) in 1398. Tamerlane penetrated as far as Delhi, looting and slaughtering mercilessly. The century following him was one of great confusion, the Lodi dynasty with difficulty holding the sultanate, and numerous kingdoms, both Hindu and Muslim, dividing India into a complex of warring states. 1498 was a significant year, for from the date when Vasco da Gama first touched the W. coast on his tour of the globe, and so aroused the interest of the Portuguese, may be counted significant European contact with India.

The most powerful of the Muslim empires in India, the Mogul, began when Babur defeated the Lodi Ibrahim at the battle of Panipat in 1526. Descended from Tamerlane and Jenghiz Khan, Babur succeeded as khan of Ferghana in central Asia when a child, and after an adventurous

warring youth in central Asia and Afghanistan turned his attention to India. In his first major invasion with an army of 12,000 men he inflicted a crushing defeat on the hosts of Ibrahim at Panipat, 50 m. N. of Delhi, and followed this up with a series of spectacular successes across the whole of the N. After his death in 1530 his son Humayun succeeded, but was driven out to Afghanistan in 1540 by the Afghan Sher Shah, whose dynasty, the Sūr, lasted only 15 years when Humayun returned to win back the throne; he died by accident in 1556. His eldest son, Akbar, then aged 14, was also obliged to fight for his throne, under the guidance of his minister Bairam Khan, and at the 2nd battle of Panipat, 1556, defeated the Hindu Hemu and definitely established the Moguls in India.

Akbar the Enlightened

Mahomedan conquerors had always offered to the vanquished the choice of conversion, tribute, or death. The Hindus, as the subject people, were contemptuously permitted to retain their own customs and religion, but taxes were imposed from which Mahomedans were free, and they were kept in a condition of strict subjugation. Akbar was an enlightened monarch, and encouraged the fullest and freest discussion of all things, and chose to treat his Hindu subjects on terms of equality. The differentiating taxes were abolished, and the whole revenue system reorganized by Todar Mahl, a Brahman. Akbar's favourite wife was a Rajput princess; military commands were thrown open to Rajput warriors; and high ministerial posts were held by Brahmans. Akbar extended the borders of his empire, but his reign is more notable for the magnanimity and generosity with which he treated those within his empire.

Akbar died in 1605, and his son Jehangir ascended the throne unopposed; but intrigues which had begun in Akbar's time were not to be stilled during the whole of the Mogul term. Within five months Jehangir's eldest son Khusrū rebelled, only to be captured and blinded by his father. It has been said that Jehangir's most important achievement was his marriage to the Persian Nur-mahal (light of the palace), later known as Nurjehan (light of the world), who became a power behind the throne, guiding the sovereign with a strong and

humane hand. Jehangir lived until 1627, leaving two sons, the elder of whom, Shah Jehan, was successful in the contest for the throne. Wars and the recovery of lost provinces mark the early years of his reign: the conquest of the great Deccan kingdom of Ahmadnagar in 1632 brought an important addition to the empire. 1637 saw the submission of Bijapur; and the exaction of heavy tributes from the kingdom of Golconda consolidated the Mogul position, though the whole of the peninsula was still not under Mogul control. The more permanent of Shah Jehan's accomplishments are his buildings, of which the Taj Mahal, built as a mausoleum to his beloved wife Mumtaz Mahal, is the most famous. The "new town" of Shahjehanabad, his own palace, and the Pearl Mosque are also notable. Partly to offset these must be counted the destruction of countless Hindu temples in the N. at this fanatical emperor's orders, the stone being used in the construction of mosques and other buildings.

Repression of the Hindus

Aurangzobe, who deposed his father in 1658, assumed full imperial powers in June, 1659, after lengthy and involved contest with his five brothers. Though able and vigorous, he was fanatical in his faith, and has been held responsible for the disruption of the empire. Reviving the repressive laws against the Hindus, he reawakened hostility between the two religious communities. He extended the boundaries of the empire to their farthest: Bijapur and Golconda were finally conquered, and at his death in 1707 his sway reached from Kabul to the extreme S. of India. Yet the provinces into which the empire was divided were so large that their governors ruled in virtual independence of the central power. The alienation of the Rajputs by the emperor's fanatic orthodoxy, the rise of the Marhattas in the Deccan, and the growing power of the Sikh community in the Punjab were other potential sources of trouble; nor must the still new presence of the Europeans in India be forgotten. Primarily there as traders, they were soon to enter critically into the power-struggles of the sub-continent.

The Marhattas were a Hindu people of the Deccan, unorganized as a state until Sivaji (1627-80) developed among them a loose but formidable organization which was

able effectively to defy Aurangzebe and promised by the mid-18th century to dominate India.

With the defeat of the Mogul armies by the Persian Nadir Shah, who in 1739 sacked Delhi, removing among other plunder the priceless Peacock Throne, the Moguls were reduced to the status of puppet rulers, and the empire became even more a loose congeries of virtually autonomous provinces. The emperor's viceroy, the nizam of Hyderabad, controlled that part of the Deccan not under Mahratta domination; nawabs or lieutenants governed Bengal and Oudh. The power of the Mahrattas gradually passed, too, from Sivaji's descendants to the peshwas (title originally of Brahman ministers whose appointment became hereditary) with the succession of Baji Rao I in 1720. In 1727 Shihu the king handed over almost complete control to this Baji Rao. By 1740 the Mahratta rule extended over the western Deccan and central India between the Narbada and Jumna rivers. The Punjab was occupied and Delhi taken by the Mahrattas in 1758, but they were defeated two years later by the Afghan Ahmad Shah Durrani. The peshwa immediately mobilised a huge army, but was again crushingly defeated at the 3rd battle of Panipat in Jan., 1761. This was the end of the power of the peshwas, and the later Mahrattas were under the leadership of the central Indian princes Sindia and Holkar.

The Portuguese in India

Following on Vasco da Gama's first contact with India in 1498, and the opening of the sea route round the Cape of Good Hope, the Portuguese led the way in India for many years; but the pressure of maritime activity curtailed Portuguese territorial conquests there, and they were content with a small number of coastal settlements at Calicut, Cannanore, Goa, and elsewhere. Among the other maritime nations of Europe, England, Denmark, the Dutch Republic, and France were the principal contenders for eastern trade, forming chartered trading companies in the early 17th century. The Dutch centred their interest mainly in Ceylon and the Malay archipelago. A Danish settlement at Tranquebar in Tanjore was founded in 1620, and another later at Serampore near Calcutta; but the Danish East India Company never achieved much power in India.

The English East India Company, first chartered on Dec. 31, 1600, from the beginning strove for a share in the India trade, and factories were founded at Surat on the W. coast in 1612, Madras on the E. coast in 1639, and on the Hooghli near the mouths of the Ganges in 1640. In 1615 Sir Thomas Roe was sent out by James I as the first ambassador to the Mogul court under Jehangir, but failed to gain the treaty that he sought. Rivalry with the Dutch was constant and fierce, and resulted in a division of territorial spheres, the Dutch retaining command of Ceylon and the Spice Islands in the eastern seas, and the British command on the mainland of India. The French company, la Compagnie des Indes, was created in 1664, and French trade in the sub-continent was soon flourishing. Pondicherri, on the E. coast, S. of Madras, was founded in 1674 as the first French settlement.

British and French Rivalry

The arrival of the French, who never in fact acquired any important territorial control in India, led to a growing rivalry which eventually spurred the British to found and expand their empire there. The ambitious French general, François Dupleix, came near to establishing supreme French power by seeing and exploiting the decline of the Moguls, courting the Indian rulers, and playing the dangerous game of local political intrigue and interference, all with the intention of driving out the British. A combination of misfortunes, lack of home-support, false alliances, and the tactical genius of his military opponent, Robert Clive, led to the almost total downfall of the French and the emergence of the British in India as political rulers of first importance.

This conflict between the French and the British was waged mainly on the Madras coast, although in its later stages it switched to Bengal. In 1744 war between England and France over the Austrian succession gave Dupleix his chance, and in 1746 Madras fell to the French, not to be restored to the British until 1749 after the peace of Aix-la-Chapelle in 1748. Although hostilities were ended between the two nations, an "unofficial" war in India began over the rival claimants to the nizamship of the Deccan and the nawabship of the Carnatic. The French favoured Muzaffar

Jang for the Deccan, the Chanda Shiah for the Carnatic, the respective candidates favoured by the British being Nadir Jang and Mohammed Ali. In the struggle the British were successful, and from this time can be counted a political force in India. It was during this struggle, in 1751, with Trichinopoly besieged by the French, that a young Company servant, Robert Clive, recently commissioned into the army, created a masterly diversion by attacking Arcot, the Carnatic capital, where his own tiny force was itself besieged; but this diversion of French forces made possible the relief of Trichinopoly.

End of French Power

In 1754 Dupleix was recalled to France, and two years later the Seven Years' War broke out in Europe, and once more hostilities in India had official home sanction. The new French commander, Lally, won a few initial successes, notably the capture of Fort St. David in 1758, but then met with a series of defeats: at the hands of Sir Eyre Coote at the battle of Wandewash in 1760, and at the fall of Pondicherri in 1761 after a courageous 9-month-long defence, which meant eventually the end of the French forces. The treaty of Paris in 1763 set the seal on French ruin in India. The superiority of the British navy, which in blockade and close support to the land forces contributed to the fall of Pondicherri, was a decisive factor in the struggle. The political division of India was now fourfold: between the British with a puppet nawab of the Carnatic; the newly powerful Mysore state under Haider Ali; the nizam of the Deccan; and the Mahrattas.

During this time the British were gradually establishing a great interest in Bengal, with Fort William as headquarters. The provincial ruler, Aliverdi Khan, was a ruthless and unscrupulous Turkoman officer who nevertheless was greatly praised by contemporary European historians. In 1756 he handed the succession to his grandson Suraj-ud-Dowlah. This prince's outrages against the British, and especially the incident of the Black Hole of Calcutta (*q.v.*), provoked open war, and the dispatch of a punitive force under Clive from Madras led to a succession of engagements culminating in Clive's victory at the battle of Plassey on June 23, 1757. The new ruler set up by the British

was Mir Jaffir; but in 1765 the Mogul emperor granted the dewan (revenue rights) of Bengal, Bihar, and Orissa to the East India Company, so officially recognizing the status of the British. Clive chose to administer the dewan through Indian agents, seeking to preserve stability in the province, and leaving Oudh nominally under the control of the nawab-vizier. The five years following the departure of Clive in 1767 were marked by mismanagement, and it was the home government's late recognition of the anomalous position of a commercial company's administering political power which led to Lord North's Regulating Act of 1773, and the political appointment of Warren Hastings as governor-general, effective 1774.

Warren Hastings in India

British India was divided into three presidencies, Bengal, Madras, and Bombay, with Bengal as the supreme presidency and Calcutta as the administrative seat. The great achievements of Warren Hastings during his 13 years of office were the creation of the administrative system of Bengal and the stabilisation of the British position rather than any expansion. A figure of bitter controversy during his lifetime, Hastings is now generally highly honoured as an administrative genius of the greatest integrity. He was forced to conduct his affairs against a background of wars with the Rohillas, the Mahrattas, and Haider Ali, as well as the hostility of his council and the supreme court. Pitt's India Act of 1784 gave more freedom to the office of governor-general in India, with affairs in the hands of a committee of the company's court of directors in London, but under the supervision of a government board of control, an arrangement which was hardly modified until 1857. The greater local freedom given to the governor-general was one of the main causes of subsequent British expansion of territory, although such expansion was often forced by circumstances upon reluctant officials.

The wars against Tippoo Sultan of Mysore and his Mahrattas of central India lasted until the closing years of the 18th century, though a decisive end was not reached until the second decade of the 19th. The annexation of some of Tippoo's territories by Cornwallis in 1792 and by Wellesley in 1799 placed much of the domain under British



protection, with the old Hindu rulers restored. Wellesley deliberately sought for British supremacy throughout the whole of India, and his system of "subsidiary alliances," which allotted a subordinate role to the Indian princes in certain matters, was directed against the dangers of the old balance-of-power between states.

The annexation of the Carnatic in 1801, six years after the death of the aged Mohammed Ali, and the treaty of Bassein in 1802, which marked the end of the power of the peshwas immediately preceded the second Mahratta War against Daulat Rao Sindia and Holkar. The third and last Mahratta War, which flared up in 1817, ended with the capture of Asirgarh in 1819 and the downfall of the Mahratta empire; subsequent Mahratta princes were appointed as nawabs under British sovereignty. Further portions of their dominion were annexed, forming one of the great achievements of Lord Moira (later 1st marquess of Hastings).

The Mogul emperor was already under British authority, and in the N.W. the Sutlej formed the boundary with the Sikh kingdom

of the Punjab and Kashmir, under Ranjit Singh, the powerful "Lion of the Punjab." A treaty of amity which he signed with the 1st earl of Minto, governor-general 1807-13, at Amritsar in 1809 he scrupulously honoured until his death in 1839. A short war between the British and the Gurkhas of Nepal, 1814-1815, ended in a treaty of friendship and the ceding of a large territory to the British. The first Burmese War, 1824, dragged on incompetently for two years, but resulted in the ceding of territories to the British, this time Assam, Arakan, and Tonnasserim provs., strengthening the N.E. frontier.

Bentinck's Reforms

Lord William Bentinck became governor-general of Bengal in 1828. His administration saw the beginning of a seven-year period of internal reforms; but even Bentinck was forced into small territorial annexations: of Cachar (made a district of Assam), and of Coorg, between Mysore and the W. coast. In 1831, too, Bentinck placed the troublesome state of Mysore under direct British rule. Reorganization of land revenue administration, and of the army, prohibition of sâti (the burning

alive of Hindu widows) and the suppression of thuggee (thagī: organized strangling for plunder by fanatical religious gangs) were among notable reforms. Bentinck again opened the executive services to Indians, and ordered the adoption of English as the official and literary language of India, a step which continued to guide the course of higher education in India, though in the face of continuous criticism. By an act of 1833 the East India Company ceased as a commercial body (although its administrative machinery continued unchanged until 1858), and its monopoly was abolished; and Bentinck became the first governor-general of India. The government of India was empowered to make laws, and pass acts instead of regulations. Sir Charles Metcalfe, Bentinck's successor, continued to liberalise Indian life by an act freeing the press of all censorship restrictions.

War in Afghanistan

The next war came during the governor-generalship of Lord Auckland, 1836-42, and was inspired by fear of Russia as a menace to British India. Auckland chose to restore Shah Sujah to the throne of Afghanistan, deposing Dost Mohammed who was thought to be in league with Russia. A British force was left in support of the new monarch at Kabul, the Afghan capital, but in 1841 the Afghans rose and forced the British to retire ignominiously, annihilating the entire force except for a handful of prisoners and one wounded officer, Dr. Brydon, who made his way to Jalalabad. In the retributive campaign which followed the Afghans were eventually subdued, and Dost Mohammed unconditionally restored, to reign until 1863 as a loyal ally.

The annexation of Sind after its conquest by Sir Charles Napier in 1843 was a much-criticised sequel to the Afghan war, a policy justified at the time by the conduct of the Sindis during that campaign. More trouble in the N.W. followed the death of Ranjit Singh. Left without any effective leadership, the Sikh army crossed the Sutlej in 1845 and after several bloody battles was driven back in defeat, but a second fierce war broke out soon after the appointment of the marquess of Dalhousie as governor-general in 1848, which ended in the subjection of the Sikhs and the annexation of the Punjab in 1849.

The second Burmese War, which was forced upon Dalhousie in 1852,

was conducted in a very different fashion from the first, and concluded with the annexation of Lower Burma, 1853. During his term of office Dalhousie's policy towards Indian principalities was based on his refusal to recognize right of succession by any but a legitimate heir, claiming that where no such heir existed the sovereignty passed to the paramount power—the government of India. In accordance with this doctrine a number of states passed to British control, among them Jhansi and Nagpur. His last annexation, of the kingdom of Oudh in 1856, was the consequence of persistent misgovernment by the Indian rulers there, and brought something like two-thirds of India under British rule.

These conquests, annexations, and cessions were made with an army composed for the most part of native troops, officered by Europeans. The European regiments, which formed always a minority, were divided into two bodies: Queen's troops and Company's troops. As an alien government, often out of sympathy with local ways and customs, and surrounded everywhere by unrest, the British were now in a position of deeply-resented supremacy. The situation was more explosive than it appeared, and its culmination in the sepoy rebellion (Indian Mutiny) of 1857-58, had a far-

reaching effect, for in 1858 the British crown formally adopted responsibility for the government of India, and the Company was wound up.

The Indian Mutiny

The causes of the sepoy rebellion have been much discussed, but the cumulation of annoyances, interferences, and fears felt by the Indian people does not altogether explain the event, which in fact was almost exclusively confined to the army. The revision of the system of land-tenure, while benefiting the cultivators, outraged the landlords and upset the clan system; the advent of new communications in the railway and telegraph alarmed the conservative Hindu element, as did the repressive measures against sâti and other religious practices; Western education appeared an affront. More directly, the annexation of Oudh was a shock to large sections of the Bengal army, many of whom, though serving the British, were subjects of the ex-king. Nana Sahib, adopted son of the last peshwa, was eager for the revival of past glories; and the dream of a Mogul restoration made a deep appeal to certain powerful Muslim factions. In addition, large bodies of European troops had been withdrawn for service in the Crimea, and against China and Persia.



The trouble with the sepoys, or Indian troops, came to a head with the issue of cartridges greased with animal fats, which endangered caste-purity, and the alarm spread with the rumour that it was the government's intention forcibly to convert the troops to Christianity. The mutiny broke out at Meerut on May 10, 1857, and in less than a month the rebellion had spread over the whole of the United Provinces and Oudh. The events which followed centred particularly on Delhi, Lucknow, and Cawnpore; the Bombay and Madras armies were hardly affected. Only in Oudh did the rebellion spread to any extent beyond the army. The storming of Delhi on Sept. 14, 1857, marked the beginning of the end, but it was not until the end of 1858 that government was restored generally, and in some areas not until the next year.

Power transferred to the Crown

On Nov. 1, 1858, the Queen's Proclamation declared the transfer of power to the crown, with a secretary of state for India and a council of 15. Lord Canning became the first viceroy, announcing his own appointment in Allahabad on the same date as the proclamation in London.

In the proclamation, further territorial extensions were renounced, and generous promises of amnesty were given: "clemency . . . extended to all offenders . . . except those . . . convicted of having directly taken part in the murder of British subjects." Great changes were visualised, and for some time the history of India is a history of reform. The reconstitution of the army, a priority task, abolished the anomaly of two bodies, and was followed by sweeping reforms in finance. The penal code, the fruit of long work by Lord Macaulay 20 years earlier, was adopted in 1860, and the following year chartered high courts replaced the supreme courts. 1861 also saw the Indian Councils Act, which empowered Indians to sit upon the governor-general's council. Lord Canning retired in 1862 and was followed by the 8th earl of Elgin, who lived only until 1863. The next Viceroy, Sir John (later Lord) Lawrence, the only member of the Indian civil service to attain the appointment, followed a peaceful programme of administration, with a special interest for the cultivators. A disastrous famine which occurred in Orissa in 1866 led to the drafting of a famine procedure which did much to alleviate dis-

tress in all parts of the country in later famines.

Lord Mayo's period, 1869-72, was likewise peaceful: his decentralisation of financial affairs was a notable reform; and he gave great encouragement to the extension of public works. Lord Mayo was on Feb. 8, 1872, stabbed to death by a convict while on an official visit to the penal settlement on the Andaman Islands. During the next viceroyalty, that of Lord Northbrook, 1872-76, it was found necessary in 1875 to depose the gaekwar of Baroda and appoint in his place a distant relative, Sir Sayaji Rao III, who, in his long reign up to his death in 1939, made Baroda one of the most prosperous states in India. In 1875 also the prince of Wales (afterwards Edward VII) visited India; and on Jan. 1, 1877, Queen Victoria adopted the title empress of India.

The fear of the Russian menace to India during the latter part of the 19th century was a constant anxiety to the Indian and home governments, and the affairs of Afghanistan as the intervening state were of first importance. Lord Lawrence's policy of "masterly inactivity"—complete withdrawal from interference—was reversed by Lord Lytton, a professional diplomat, viceroy 1876-80. The Second Afghan War was provoked by the Afghan Shere Ali's apparent favour towards the Russians, and he was dethroned, his son Yakub Khan recognized as ameer, and an English mission appointed. The British envoy, Sir Louis Cavagnari, and his companions were murdered soon after his arrival in 1879, and a small British force was overcome at Maiwand in 1880.

Kabul to Kandahar March

There followed a series of distinguished actions led by General (afterwards Lord) Roberts, notably the famous march from Kabul to Kandahar, and again the Afghans were defeated. A new ameer, Abd-ur-Rahman Khan, was appointed, and entered into new agreements with Great Britain. Frontiers were defined in 1889. As the result of Lytton's policy, Baluchistan had been brought under British control, with consequent command of the Bolan and Kurram Passes, which facilitated entry into Afghanistan and British strategic hold on that country.

The almost legendary popularity of Lord Ripon, the "liberals' viceroy," 1880-84, is due in great

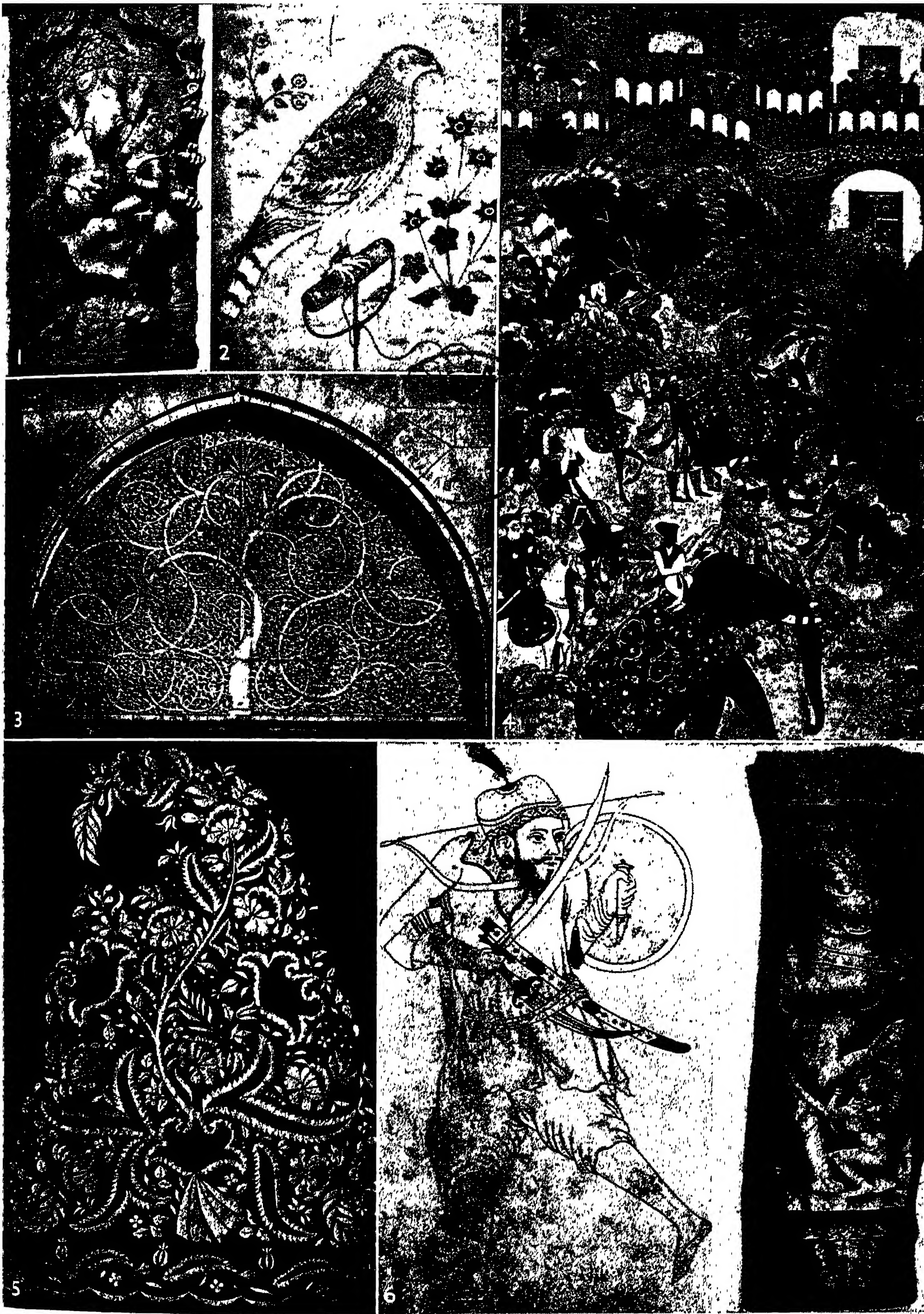
measure to his encouragement of local self-government and the association of Indians with the administration. The Ilbert Bill of 1883 sought to make Europeans subject to trial by Indian magistrates but provoked such an outcry from the European community that it was dropped. Lord Dufferin, 1884-88, consolidated the friendship with Abd-ur-Rahman in Afghanistan, after the threat of open war between Russia and Great Britain following a frontier clash between Russians and Afghans in 1885. The third Burmese War of 1885 lasted only a fortnight, and was provoked by the intrigues of the king, Theebaw, in courting French protection, and by his antagonism to the British. Theebaw was deposed and exiled, and the whole of Upper Burma annexed in 1886. It was united in 1897 with Lower Burma, and the whole country ruled as a province of British India until 1937, when it was declared a separate country with its own constitution. Troubles continued in Burma for several years after the war of 1885, with the country in turmoil from irregular gangs and roving bands.

The frontiers of British India were stabilised under the 9th earl of Elgin, 1894-99, the difficult task of making a line between India and Afghanistan being settled by a commission, and treaty agreements made with Russia.

Birth of Indian National Congress

The beginnings of an effective nationalism in India date from 1885, with the first session of the Indian National Congress, held in Bombay. Owing its origin to the efforts of a retired (British) civil servant, A. O. Hume, and composed of Hindus, Muslims, and some Europeans, it had as its purposes national unity and a more democratic Indian government.

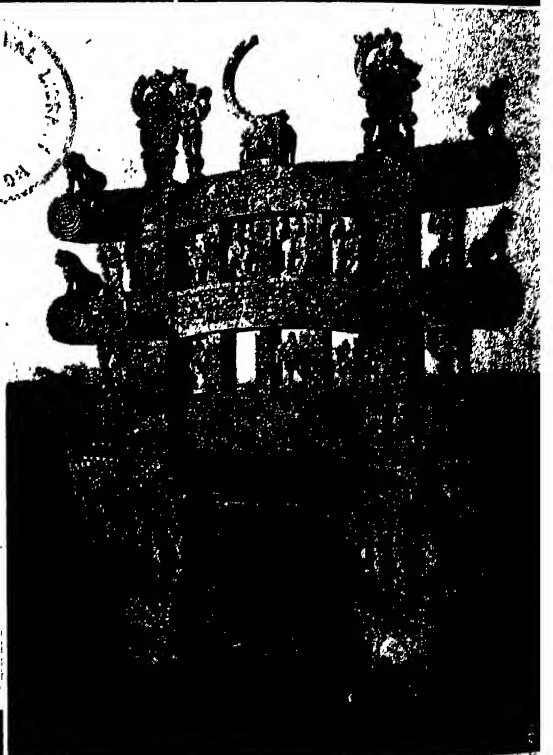
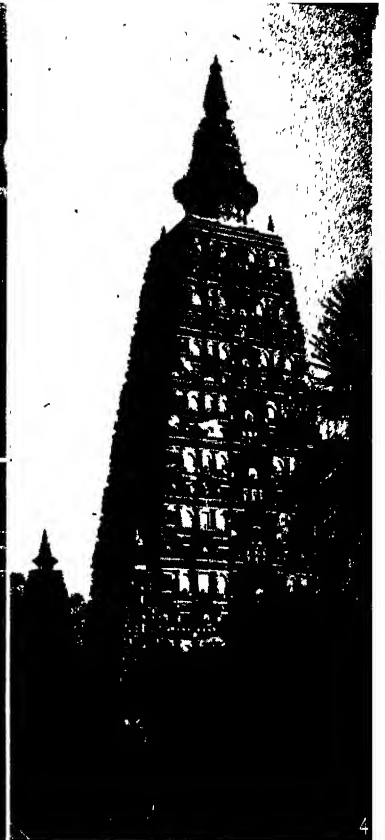
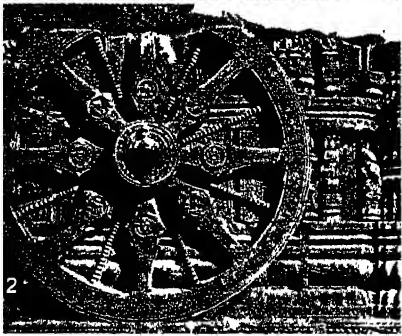
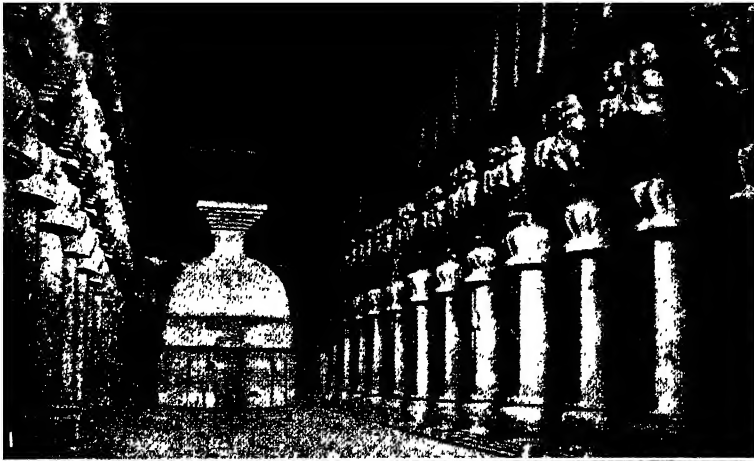
But the government remained centralised and paternal, and the political history of the country becomes one of growing demands by nationalists for greater responsibility and their scorn of "reforms." The viceroyalty of Lord Curzon, 1899-1905, was perhaps the height of efficient centralised administration. He reformed education and the police, and legislated for the preservation of the antiquities of India and created the organization to effect this work. On the frontier he aimed at the preservation of order, and a new province, the North-West Frontier Province, was formed, administered by the central govern-



1. Slate relief at Bihar, 12th cent., representing Ganesa holding Parvati. 2. Painting of a hawk, of the Mogul school, 17th cent. 3. Pierced sandstone window of the mosque of Sidi Sayyid, Ahmadabad, early 16th cent. 4. Painted illustration, 16th cent., to the Akbar-Namah,

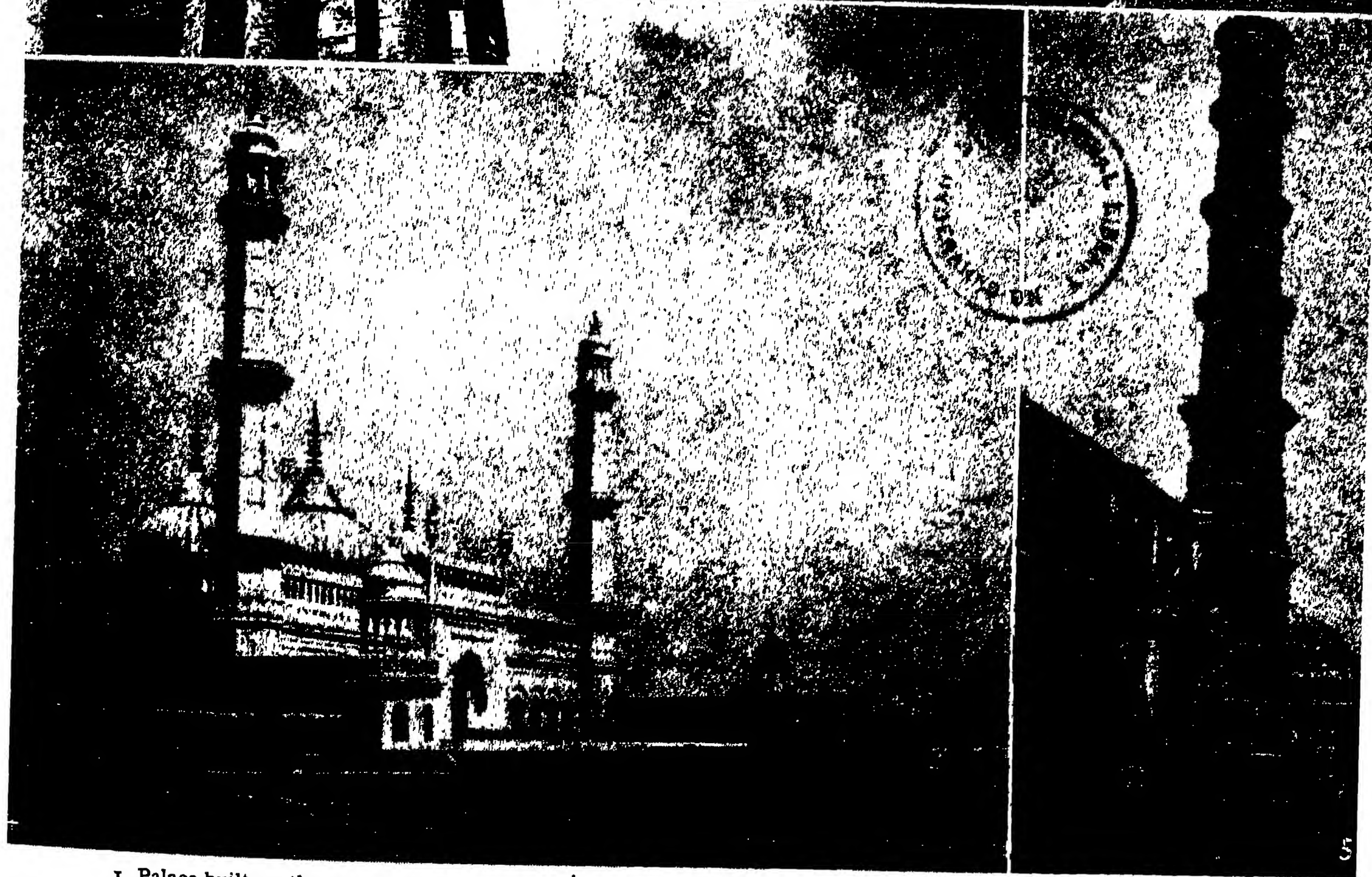
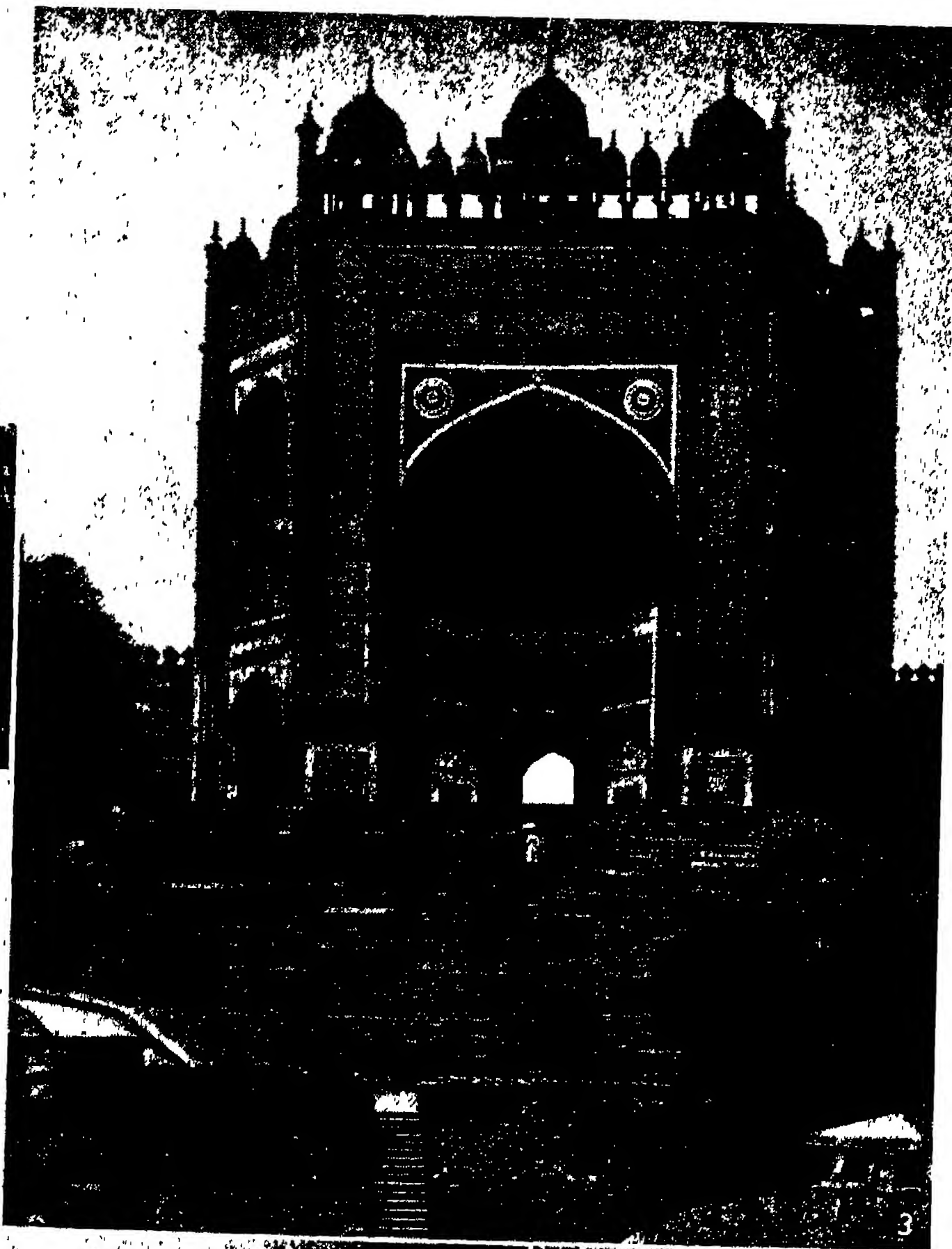
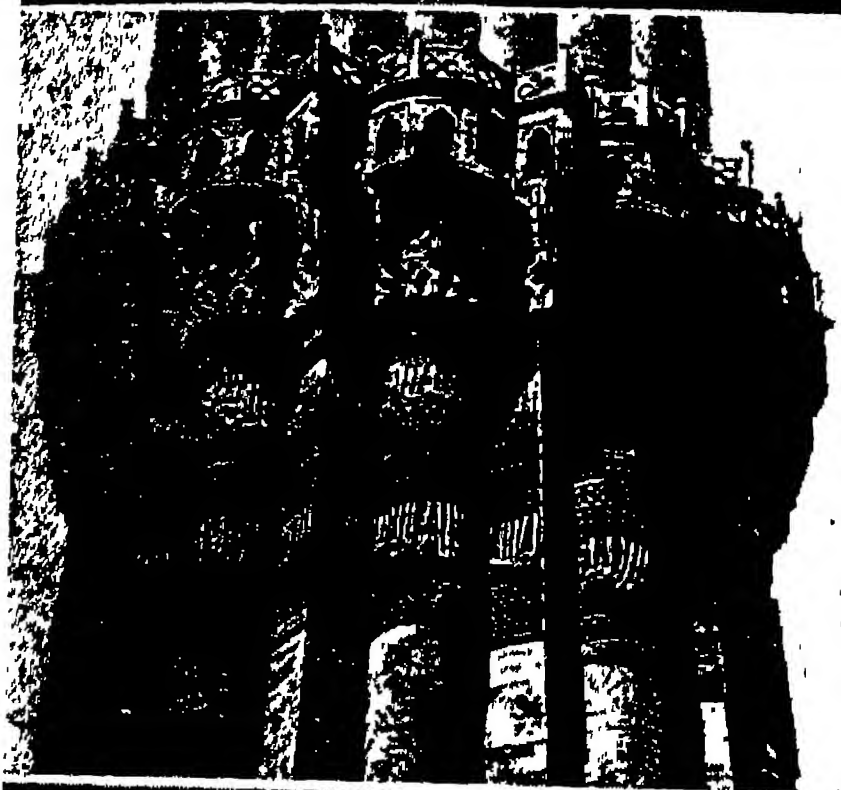
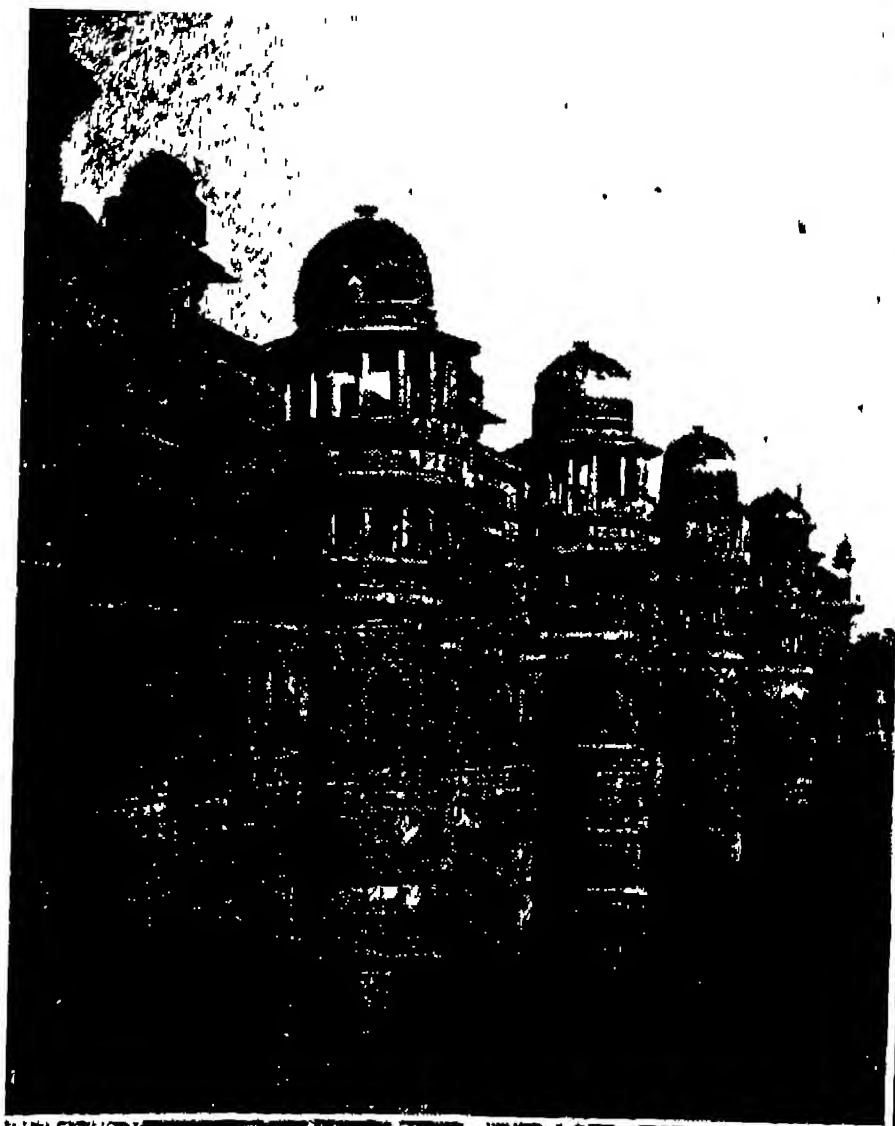
official record of Akbar's life, depicting the emperor's entry into Surat. 5. Muslin dress-piece, decorated with drawn-thread work and embroidery in white cotton thread, Madras, 19th cent. 6. Pen-and-ink drawing of a warrior, early 15th cent. 7. Marble relief of a leogryph, Rajputana, 10th cent.

INDIAN ART: PAINTINGS, CARVINGS, AND EMBROIDERY OF ANCIENT AND MODERN SCHOOLS



1. Buddhist temple of Karli, in the Western Ghats, entirely hewn from solid rock 2,000 years ago, and still covered with its original teak roof. 2. Carved wheel, Black Pagoda, Kanarak, Orissa (Hindu, 13th cent.). 3. 13th cent. carving of the Buddha's Ladder, Barhut, Nagod. 4. The Buddha-Gaya, beautiful brick temple of unknown date, marking the birthplace of Buddhism. 5. Kandarya Mahadeva, 10th cent. Vishnu temple at Khajuraho, Bundelkhand. 6. One of the four gateways of the 2,000-year-old shrine of Sanchi, Bhopal, carved to depict the Buddha's life.

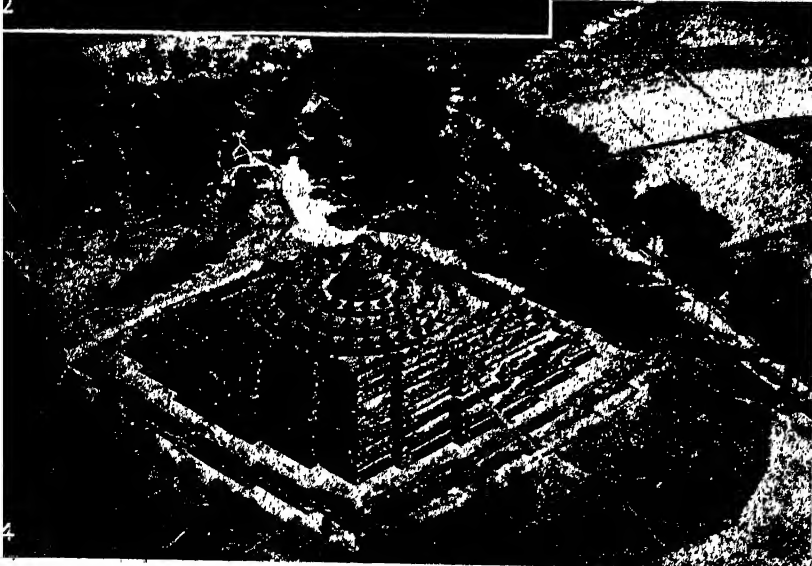
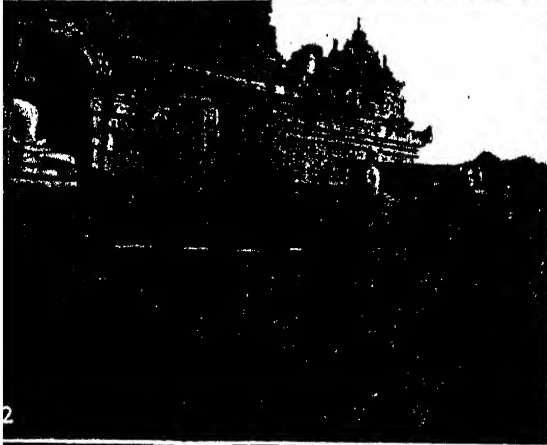
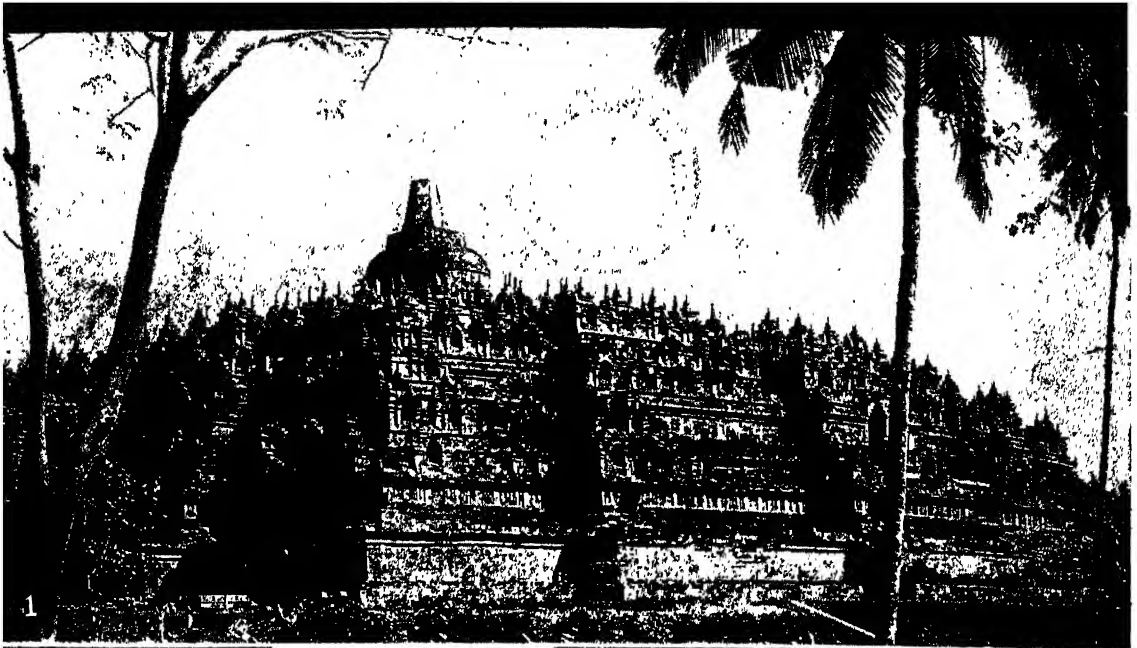
INDIAN ART : ARCHITECTURE AND SCULPTURE OF BUDDHIST AND HINDU TEMPLES



1. Palace built on the rock at Gwalior, 15th cent., showing Hindu architecture in a transitional phase, modified by Muslim influence. 2. Decorative use of arabesques and Arabic script in carvings of the Kutb Minar, near Delhi, 13th cent. 3. Akbar's "gate of victory," southern gateway

to the great mosque at Fatehpur Sikri, which represents the culminating grandeur of Mogul architecture. 4. The Imambara, Lucknow, built by Asaf-ud-dowla, 1784, place of Muslim pilgrimage. 5. Minar, or tower, of the early 16th-century mosque of Sidi Sayyid, at Ahmadabad, Bombay

INDIAN ART: THE INFLUENCE OF THE MUSLIM FAITH ON THE ARCHITECTURE OF INDIA



just as some of the finest Roman art is to be found beyond the borders of Italy, so one of the outstanding memorials of ancient Indian culture is in the heart of Java, 2,000 m. from the seats of northern Indian civilization. Boro Budur is a low hill encased within a pyramidal shell of black stone, intricately carved and terraced, with two

miles of sculptured reliefs. It dates probably from the 7th century. 1. General view. 2. The carved walls: showing one of more than 4,000 niched figures of the Buddha. 3. Bas-relief: Cortege of the Sacred Elephant. 4. Air view. 5. Statue of the Buddha, removed from its perforated cupola shrine: there were originally 72 such cupolas

INDIAN ART: THE MAGNIFICENT BORO BUDUR, BUDDHIST SHRINE IN THE HEART OF JAVA

ment in Calcutta. The partition of the province of Bengal caused great bitterness and aroused new violent nationalist feeling. Unrest increased during the term of the 8th earl of Minto, 1905-10, and was accompanied by acts of terrorism, assassinations and boycotts, which forced Lord Minto to make new controlling laws. But Lord Minto is chiefly remembered for the new legislation known as the Morley-Minto reforms, or the Indian Councils Act of 1909. Lord Morley was then secretary of state for India, and the act which popularly bears the names of the two men secured an Indian majority in the provincial legislatures, with a seat in the governor-general's council open to an Indian. Provision was made for recommended nominations from the Muslim communities, the universities, and the municipal authorities.

During the great durbar at Delhi on the occasion of the visit of King George V and Queen Mary in 1911, it was announced that the capital was to be moved from Calcutta to Delhi, that Bengal was to be restored and the partition modified, with a new province, Bihar and Orissa, formed from West Bengal.

First Great War

The First Great War, in which India raised the largest volunteer army in history (more than 2,000,000 men), stilled the nationalist demands for a time. Indian units served in France, in Mesopotamia, Palestine, and East Africa.

In 1916 Lord Chelmsford succeeded Lord Hardinge as viceroy; in 1917 Edwin Montagu became secretary of state for India, and in the same year announced the proposed measures for a new policy in India (the Montagu-Chelmsford reforms). Embodied in the Government of India Act, 1919, these provided for the beginnings of parliamentary government, and declared for the gradual development of self-rule. In the provincial legislative councils at least 70 p.c. of the members were to be elected; special minority representation was guaranteed; an elected president was to replace the governor; the councils were to control finance; and diarchy was introduced into the executive. The elective principle in the central legislature, now divided into two chambers, was increased, as was Indian representation in the executive. Measures were also taken in London: three Indians were to serve on an

advisory council to the secretary of state, and a high commission was to be established. A chamber of princes representing the 600 or so Indian states, was set up, with seats for 100 rulers from the senior states; it had no powers of legislation.

Disturbances following the war were widespread. Congress was dissatisfied with the new reforms, and formed an alliance with the Muslim League, founded in 1906 in opposition to the Hindu-dominated Congress. In the Punjab in 1919 agitation increased, and the stern suppression by General Dyer of a gathering at Amritsar, in which 379 people were killed, created a storm of outraged protest in India and Great Britain alike. The year 1919 saw also the invasion of the Punjab by the ameer Amanullah of Afghanistan; even after his defeat there was almost constant trouble with the frontier tribes. In 1922 occurred the outbreak in Malabar of a rebellion of the Moplahs, a fanatical Muslim sect attempting forcibly to convert the Hindus to Islam.

Gandhi's Influence

Mohandas Karamchand Gandhi, imprisoned in 1922 as a result of the disturbances caused by his leadership in demands for *swaraj* (self-government), was released in 1924 on health grounds. Elected president of the Indian National Congress, he turned that body, with his advocacy of non-violence and non-cooperation, into a revolutionary organization. Repression and imprisonment of its leaders followed. The Simon commission, appointed to consider the best way to self-government, but counting no Indian representatives among its members, was boycotted by the nationalists during its tour of India, 1927-28. The commission led to a series of three Round Table Conferences, 1930-31, in London, to which Indian nationalist leaders were invited. The resulting Government of India Act, 1935, further advanced India towards home rule. Immediate provincial autonomy was granted, and an all-India federation formed of representatives of the provinces and states. The federal parliament was composed of a legislative assembly and a council of state. Diarchy was abolished in the provinces, but was preserved in the central government. Dominion status and full self-government were promised to India after a transitional period. Provincial elections held in 1937

under the new act gave the Indian National Congress majorities in 8 of the 11 provinces, and the party formed coalition governments with Muslim leaders in Bengal, Punjab, and Sind; but Muslim objection to Hindu domination was beginning already to find expression in the demand for an independent state for the Muslim community.

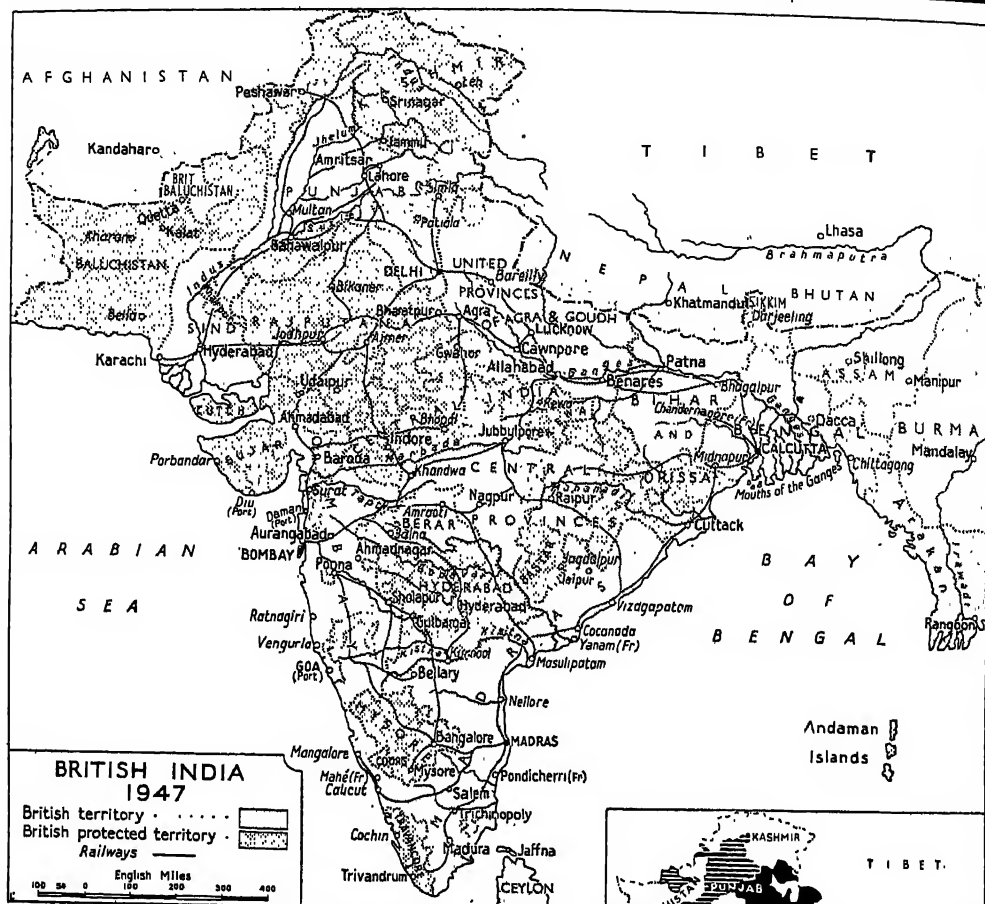
Second Great War

During the Second Great War Congress refused all cooperation with the British government. The mission of Sir Stafford Cripps to Delhi in 1942, reiterating the offer to create after the war an Indian union as a dominion with a constitution framed by the Indians themselves, failed to find agreement between the Muslims under M. A. Jinnah and the Congress leaders, the Muslims now demanding partition. Negotiations ceased when Congress asked for an immediate cabinet government, with complete powers. With the ending of the meeting Congress called for open rebellion, and the leaders were arrested.

Despite nationalist opposition, India's involvement in the war was automatic, and its contribution conspicuous. Volunteer Indian contingents served and fought with their customary bravery in Abyssinia, N. Africa, Italy, Burma, and elsewhere, and the Indian sub-continent became the main supply arsenal for the Allied South-East Asia Command. The Japanese army, threatening the N.E. frontier, was eventually forced back into Burma and defeated by the British 14th army, consisting of 2 British, 9 Indian, and 3 African divisions; Rangoon was recaptured in May, 1945. The Royal Indian Navy also played an invaluable part throughout the war, and the Royal Indian Air Force, manned by Indians, served as an attacking, defensive, and supply force. The development of Indian industries to supply war materials resulted in the transformation of India by the time the war ended in Aug., 1945, from a debtor to a creditor nation.

In 1946 a cabinet mission, composed of Lord Pethick-Lawrence (secretary of state), Sir Stafford Cripps, and A. V. Alexander, again negotiated with the Indian leaders, but once more Muslim opposition to voting procedure brought the talks to a standstill.

In March, 1947, Viscount Mountbatten became viceroy in succession to Lord Wavell; at the same



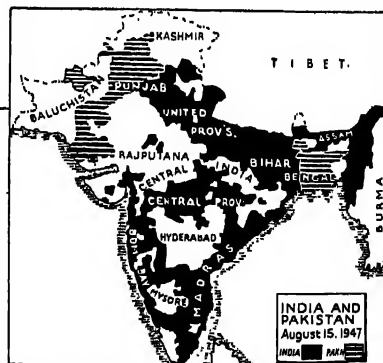
time the prime minister, C. R. Attlee, declared that on a date not later than June, 1948, full power would be handed over to an Indian government. Hindu-Muslim rioting broke out all over India, and Muslim fears of being swamped by the Hindu majority caused Lord Mountbatten to formulate his own plan: the partition of the sub-continent into two dominions, India and Pakistan, Hindu and Muslim. British withdrawal was to be effected by Aug. 15, 1947. The defence forces were to be divided proportionately between the two new states.

India and Pakistan given Independence

An Imperial act embodying these proposals was passed in London without opposition on July 5, 1947. Lord Mountbatten was appointed governor-general of the new dominion of India at the request of the Hindus, with Jawaharlal Nehru as the first prime minister; M. A. Jinnah was the first governor-general of Pakistan.

Independence Day was celebrated amid great rejoicing in both the new states on Aug. 15, 1947, and the last British troops left Indian soil on Feb. 29, 1948.

A boundary commission, under the chairmanship of Sir Cyril (afterwards Lord) Radcliffe, which fixed the frontiers between the two countries, was unable to reach agreement in certain areas, and the chairman made an award which now popularly bears his name. This granted to the Union of India sovereignty over the British provinces of United Provinces, Bihar, Bombay, Central Provinces, Orissa, Madras, Assam, western Bengal including the Calcutta area, and eastern Punjab; Pakistan was divided into two completely separated parts, composed of the North-West Frontier Province, Sind, Baluchistan, western Punjab in the west and eastern Bengal plus the Sylhet district of Assam in the east. The birth of the two dominions



was followed by violent communal disturbances, particularly in the Punjab, where conflicts involving the Sikh, Muslim, and Hindu communities raged for many months, and in Bengal, where religious outbursts were followed by mass transfers of Hindus to India and Muslims to Pakistan.

The princely states had been given the choice of electing to accede to either of the two new dominions, and during 1947-50 most chose to accept the sovereignty of the dominion in which they were situated; but certain complications arose. The nizams of

Hyderabad claimed the right to independence, but this was disallowed by the Indian government and after a threat of force the state acceded to India. The Muslim ruler of the small state of Junagadh, with a Hindu majority, claimed allegiance to Pakistan, whose frontier lay 450 m. away, but after protests and occupation by Indian troops, a plebiscite was held which favoured union with India. The accession of Kashmir, with a Hindu ruler and a large Muslim majority, remained in dispute.

French possessions were transferred to India—Chandernagore in 1950, Pondicherry, Karikal, Yanam, and Mahé in 1954.

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ART AND ARCHITECTURE. Indian art was indigenous, though it was influenced to some degree by Mesopotamian and early Persian art. A characteristic Indian art is already manifest in the Indus civilization of the third millennium B.C., after which there is a gap until the Maurya period, 322-185 B.C. The long intermediate development which must be postulated has not been traced, although excavations have yielded some details, e.g. the magnificent pillars with finely sculptured capitals showing Iranian influence, set up by the emperor Asoka to bear his edicts (e.g. at Sarnath) and the great sculptured railings and gateways of the stupas, sacred mounds enshrining the ashes of the Buddha, which continued to develop in the succeeding period (Bharhut, Sanchi, Amaravati).

The Gandhara school, which flourished in N.W. India and Afghanistan, c. 200 B.C.-A.D. 320, shows Hellenic influence. But the classical age of Indian sculpture is the Gupta period, c. 300-500, when the perfected types of divinities, Buddhist and Brahmanical, were developed. It was the Gupta art which was carried to the Indian colonies of the far east, Malaya, Cambodia, Java. The climate has played havoc with much of the superb work of the sculptors of this and other ages, but enough has survived to show that they were consummate modelers, keen observers of character, skilled in composition.

The sculptors were averse from portraiture, because individualism was repugnant to the spirit of their faith. Their aim was to produce, if possible, an impersonal type of face, for their main concern was with the spiritual and eternal. It is impossible to appraise Indian skill in painting with any approach to exactitude, as nearly all the paintings of the past have vanished. The painters worked chiefly in fresco, a method still practised, since it is exceptionally adapted to interior decoration in the dry tropical climate, and, with care, is more durable than oil painting. The remains in the cave temples of Ajanta (q.v.) are among the finest specimens.

Temple Architecture

The period following the Gupta supremacy saw great architectural development and produced a northern type of temple with curvilinear towers (e.g. Khajuraho) and a southern type with stepped towers (e.g. the Shiva temple at Tanjore). Vast quantities of sculpture adorned these, and also the great temples which sprang up in Indonesia of which Boro Budor (Java, c. the 7th century) and Angkor Vat (Cambodia, 12th century, see Angkor Vat illus.) are the most famous.

In the Deccan, another architectural feature is the rock temple, generally a basilica-like chamber hewn out of the solid rock in some lonely spot where it could serve one of the monastic communities of the Buddhist period, though Jain and Hindu temples of this type also exist. The most remarkable are those of Ajanta (Buddhist, 2nd century B.C. to 6th century A.D.), Ellora (Buddhist, Brahminical, and Jain, 5th-10th century), and the island of Elephanta, near Bombay (Hindu, 9th century). The Muslim conquest brought

the penal prohibitions of the Koran against images, but even the early conquerors were patrons of the arts and encouraged Hindu craftsmen to build for them magnificent mosques and tombs, to which the newcomers contributed the important ideas of the arch, the dome, and the minaret. Notable achievements are the Kutb Minar, 1231, at Delhi, with a great tapering tower, and the tomb of Altamsh, 1235. Under the Mogul emperors art became less austere. Akbar's city, Fathpur Sikri, the fort at Agra, and the Taj Mahal, completed 1650, show the variety, exuberance, and power of Mogul architecture, while in painting the famous school of miniaturists flourished.

Alike to western and eastern taste, these Mogul miniatures, deriving remotely from the Persian school, are the most acceptable examples of Indian pictorial art. Painted on very fine Indian or Chinese paper, the colour scheme in the figure subjects is harmonious and vivid, and, small though the pictures are, they possess inexpressible decorative value and charm. Their minuteness of detail and exquisite finish are marvellous. The drawing is sometimes faulty and naïve, the composition stiff and conventional, but the portrait miniatures, whether of man or bird, are masterly.

After the death of Aurungzebe in 1707 anarchy set in, and by the time that British rule was firmly established Indian artists had suffered eclipse. With the advent of the 20th century a revival of art on Indian lines and following Indian traditions was seriously attempted under the guidance of such artists as Abanindro Nath Tagore, Nanda Lal Bose, and Surendra Nath Ganguly, supported by the enthusiastic advocacy of E. B. Havell, formerly principal of the government school of arts and keeper of the Calcutta art gallery.

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India, Union of. Independent republic within the British Commonwealth. The self-governing dominion of India came into existence on Aug. 15, 1947, with the

establishment of the two new dominions of India and Pakistan. The Union of India, area (excluding Jammu and Kashmir state) 1,269,640 sq. m. (of which 130,000 sq. m. is water), is the seventh largest country in the world, with a land frontier of some 8,200 m. and a coastline of 3,500 m. India lies wholly to the N. of the equator, between lats. 8° and 37° N. and longs. 66° 20' to 97° E., and measures at its greatest 2,000 m. from N. to S. and 1,700 m. from E. to W. The Himalaya mts. forming the northern boundary contain the world's highest peaks, including Everest, 29,002 ft. or more; Godwin-Austen, 28,278 ft.; and Kanchinunga, 28,146 ft.; and travel across them is limited to a few high passes. The great Indo-Gangetic plain between the Himalayas to the N. and peninsular India to the S. forms a complete contrast of almost uninterrupted flatness for nearly 1,500 m. from W. to E. and 200 m. from N. to S. Almost the whole of peninsular India is a broken plateau 1,500-4,000 ft. high, with occasional peaks reaching 9,000 ft. Rising very steeply on the W. from the Arabian Sea to the W. Ghats, the plateau slopes gradually E., the E. Ghats forming

a much lower escarpment on to a coastal plain along the Bay of Bengal.

The climate is dominated by the monsoonal rhythm, but varies greatly in intensity and definition from region to region. The monsoonal pattern is typified by the climate of the Ganges delta, Bengal. Here the seasons are: cold season, Oct. to Feb.; hot dry season, March to June; wet season, June to Sept. The S.E. monsoon brings torrential rain during the wet season, especially in the E. coastal regions, and in the Himalayas. In the extreme S.E. a second wet season comes with the N.E. monsoon in Oct.-Dec.; Madras city enjoys this winter rain period.

(Fuller details concerning physiography and climate will be found in the preceding article India: Sub-continent of Asia.)

THE REPUBLIC OF INDIA, 1956

STATES		
	Area (sq. m.)	Pop. (est.)
Andhra Union ..	110,250 ..	32,200,000
Assam ..	84,924 ..	9,000,000
Bihar ..	67,830 ..	38,930,000
Bombay ..	188,240 ..	47,800,000
Kerala ..	14,980 ..	13,600,000
Madhya Union ..	171,200 ..	26,100,000
Madras ..	50,170 ..	30,000,000
Mysore ..	72,730 ..	19,000,000
Orissa ..	60,140 ..	14,600,000
Punjab ..	46,616 ..	16,000,000
Rajasthan ..	132,300 ..	16,000,000
Uttar Union ..	113,410 ..	63,200,000
West Bengal ..	33,279 ..	26,160,000
TERRITORIES		
Andaman and Nicobar Islands ..	3,215 ..	30,000
Delhi ..	578 ..	1,700,000
Himachal Union ..	10,904 ..	1,120,000
Laccadive and Amindivi Islands ..	..	20,000
Manipur ..	8,628 ..	600,000
Tripura ..	4,116 ..	640,000

ton, tobacco, jute, and sugar-cane, form the basis of some of India's main manufacturing industries. The forest area is about 22 p.c. of the total land surface; and apart from the value of the timber, cane, gums, rubber, etc., obtained from them, the forests are important in soil conservation. Sal and teak are the most widespread of the commercial timbers, but conifers are also found in great abundance, especially in the northern mountain areas.

Artificial irrigation is a matter of first importance; traditional methods have been practised for thousands of years. Major barrage schemes, many begun during the British period, operate in the Cauvery, Kistna, and Periyar river valleys in the S., while extensive canal systems utilise the waters of the Ganges, Jumna, and Sutlej in the N. Newer schemes are concerned with hydro-electric power (potentially almost unlimited) as well as irrigation; the most important include: the Bhakra-Nangal project on the Sutlej; the Hirakud dam on the Mahanadi; the Damodar Valley project (Bihar and Bengal); Tungabhadra project (Deccan); Kakrapar weir in the Tapi valley above Surat; and the Mayurakshi reservoir (W. Bengal).

India's mineral resources include iron ore, mica, copper, chromite, and other metals, and coal in Chota Nagpur; manganese, especially in Madhya Union; and mica. Iron ore reserves awaiting development have been estimated at 10,000 million tons. Petroleum is worked in Assam, but the wells there supply only about one-tenth of India's

THE REPUBLIC OF INDIA, 1950-56

GOVERNORS' STATES

	Area (sq. m.)	Pop. (1951)
Assam ..	54,084 ..	9,129,442
Bihar ..	70,368 ..	40,218,916
Bombay ..	115,570 ..	35,943,559
Madhya Union ..	130,323 ..	21,327,898
Madras ..	127,768 ..	56,952,332
Orissa ..	59,869 ..	14,644,293
Punjab ..	37,428 ..	12,638,611
Uttar Union ..	112,623 ..	63,254,118
West Bengal ..	29,476 ..	24,786,683

RAJPRAMUKHS' STATES

Hyderabad ..	82,313 ..	18,652,964
Madhya Bharat ..	46,710 ..	7,941,642
Mysore ..	29,458 ..	9,071,678
Patiala and East Punjab States Union ..	10,099 ..	3,468,631
Rajasthan ..	128,424 ..	15,297,979
Saurashtra ..	21,062 ..	4,136,005
Travancore-Cochin ..	9,115 ..	9,265,157

CENTRALLY ADMINISTERED STATES

Ajmer ..	2,425 ..	692,506
Bhopal ..	6,921 ..	838,107
Bilaspur ..	453 ..	127,566
Coorg ..	1,593 ..	229,255
Cutch ..	8,461 ..	567,825
Delhi ..	574 ..	1,743,992
Himachal Union ..	10,600 ..	989,437
Manipur ..	8,820 ..	579,058
Tripura ..	4,049 ..	649,930
Vindhya Union ..	24,600 ..	3,577,431

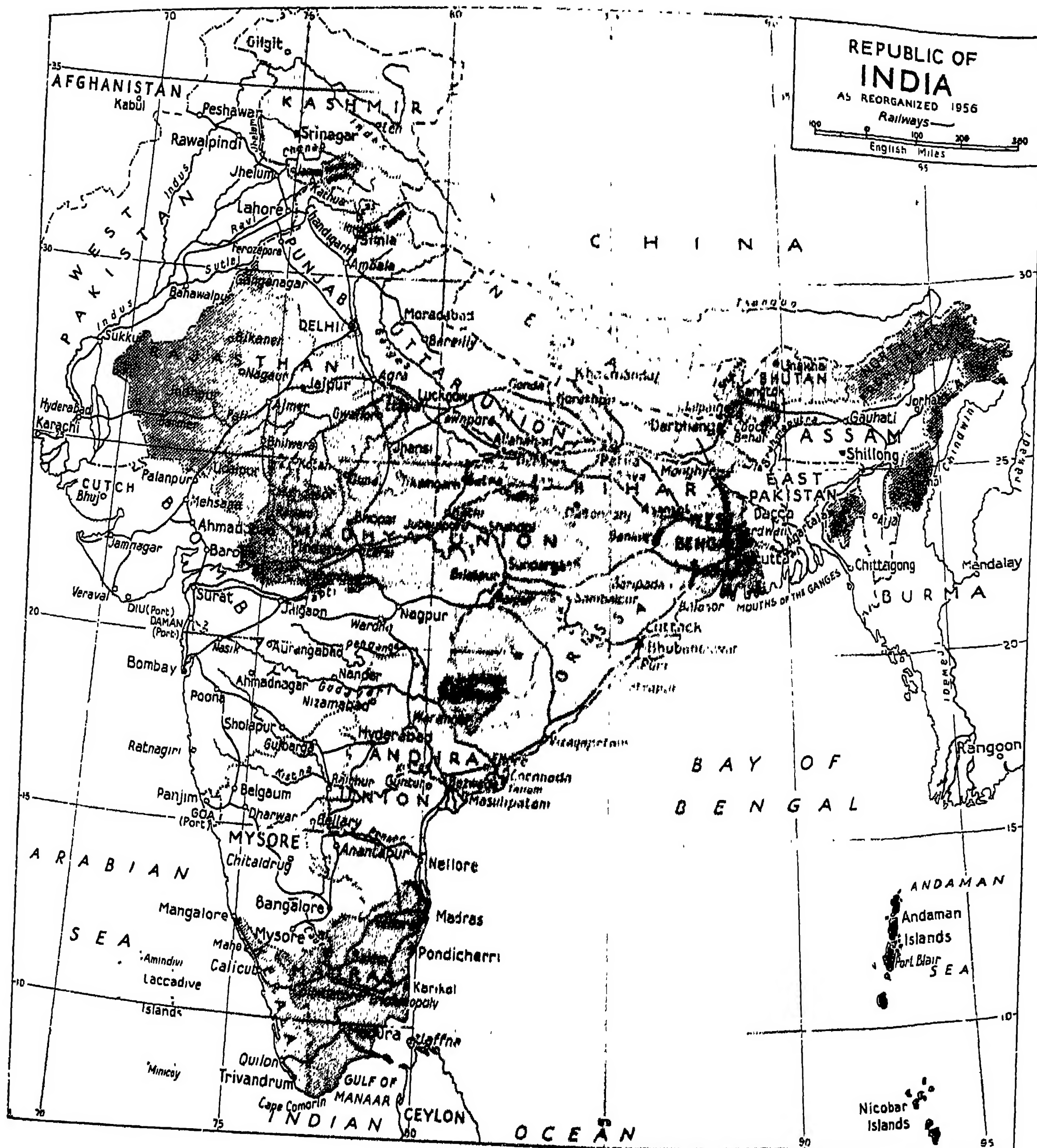
TERRITORY

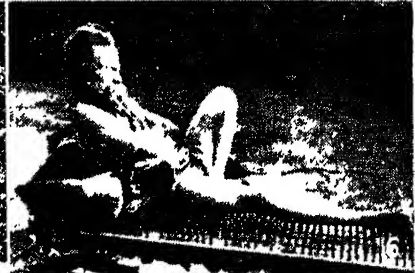
Andaman and Nicobar Islands ..	3,143 ..	30,963
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The population at the census of 1951 was 356,891,624—12.5 p.c. more than in the same areas in 1941.

INDUSTRY AND TRADE. India is predominantly a rural country, with more than 70 p.c. of its people dependent on the land. Five-year plans drawn up from 1951 aimed at developing industry and improving agriculture in order to raise living standards generally.

The principal crops produced are rice, wheat, grain, barley, and maize, sugar-cane, ground-nuts, pulses, cotton, jute, tea, coconuts, mangos and other fruits. Food-grains provide the bulk of the country's exports, but by far the largest portion of them is used for immediate home consumption. The cash crops, tea, cot-





1. Thatching heaps of salt, made by evaporating seawater on the coast of Bombay, to protect them from the monsoon rains. 2. Young fisherman casting his net into the sea. 3. A Brahmin boy. 4. Pressing and

baling doormats made of coir in a factory at Alleppey, Kerala. 5. A girl of the Mahrattas with a temple offering. 6. A fakir at rest. 7. Dhobis (washermen) at work near Bombay. 8. A village well head in Punjab

INDIA ACTIVITIES AND TYPES OF THE VAST REPUBLIC



1. Hill porter of the Himalayas carrying heavy load from a forehead strap. 2. Street scene at a hill station. 3. Four-wheeler bullock "truck," peculiar to Delhi and district. 4. Temple drummer boy. 5. Sikh tailors

working with sewing machines. 6. Pani wallah, or water vendor, in a bazaar. 7. Labourer breaking stones. 8. Family pilgrimage to Birla Mandir, Delhi, the women wearing the customary bright yellow saris

INDIA: SCENES OF DAILY LIFE IN THE HILL STATIONS AND THE CITIES

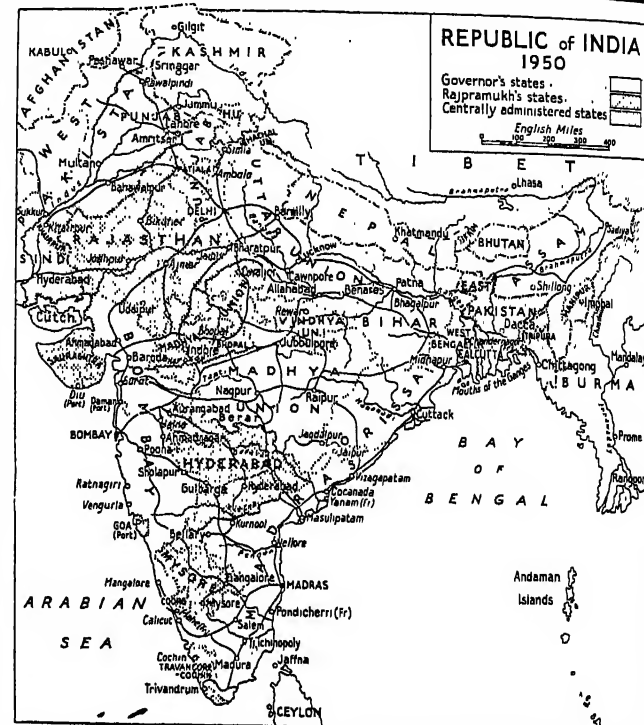
needs. The chief industries are the making of cotton and jute textiles, iron and steel goods, chemicals, tobacco, cement, motor cars, and paper; general and electrical engineering; and the preparation of tea, sugar, and vegetable oils. Calcutta commands a large industrial region along the Hooghli river which attracts most of the heavy and machine industries, partly by virtue of its proximity to Chota Nagpur; Calcutta is also the principal jute-manufacturing town. The large iron and steel works at Jamshedpur owe their development to the Parsee Tata family. Bombay city and Ahmadabad are the chief cotton weaving towns. Bombay is also the focus of important hydro-electric power schemes, and is the h.q. of the Indian film industry. Nagpur, another important cotton manufacturing town, has also other industrial activities; at Bangalore is the first Indian aircraft factory; Benares, Cawnpore, Delhi, Madras are of growing importance as industrial towns.

Of the cottage industries, cotton weaving is the most prevalent, but carpet weaving and the making of silks, brocades, pottery, and brass are very widespread.

Transport Facilities

The principal ports are Calcutta, inland on the Hooghli; Madras and Vizagapatam on the E. coast, both with artificial harbours; and Bombay and Cochin in the W., where harbour facilities are natural. The railway system, which dates from 1853, and has over 35,000 m. of track, about evenly divided between broad-gauge and metre-gauge, with some 3,000 m. of narrow-gauge, provides the main means of transport. The roads are often inadequate and do not form a completely integrated network. The total mileage is 370,000, of which over 100,000 is metalled; many roads can be used only in good weather. The Grand Trunk Road, the most important artery, runs about 1,500 m. from Calcutta via Benares, Cawnpore, Agra, and Delhi to Amritsar in Punjab. In 1953 air transport was nationalised; there are international airports at Calcutta, Delhi, and Bombay, and many others for internal services.

RELIGION AND LANGUAGE. The predominance of Hinduism as the religion of the republic of India by no means indicates uniformity of blood among the people, nor indeed any real uniformity of belief, for Hindus may hold views



varying from an exalted philosophical theism to a superstitious belief in an extensive pantheon of deities. Distribution of population by religion at the 1951 census was: Hindu 303,200,000 (85 p.c.); Muslim 35,400,000 (9.93 p.c.); Christian 8,200,000 (2.3 p.c.); Sikh 6,200,000 (1.74 p.c.); Jain 1,600,000 (.45 p.c.); Buddhist 200,000 (.06 p.c.); Parsee (Zoroastrian) 100,000 (.03 p.c.); Tribes 1,700,000 (.46 p.c.); others 100,000 (.03 p.c.).

There are two major language groups, Indo-Aryan in the N. and Dravidian in the S., but many smaller language groups occur, including the Mon-Khmer languages of the Khasi Hills in Assam, the Munda languages of Chota Nagpur, and the Tibeto-Burman languages of parts of the Assam-Burma hills. The 1951 census enumerated 845 languages or dialects spoken; this figure includes 63 non-Indian languages. In the constitution of 1950, 14 languages are officially specified (15 if Hindustani is counted as separate from Hindi and Urdu.) These are, together with figures: Hindi, Urdu, Hindustani, and Punjabi (total) 149,944,311 (46.3 p.c.); Telugu 32,999,916 (10.2 p.c.); Marathi 27,049,522 (8.3 p.c.); Tamil 26,546,764 (8.2 p.c.); Bengali 25,121,674 (7.8 p.c.); Guja-

rati 10,310,771 (5.1 p.c.); Kannada 14,471,764 (4.5 p.c.); Malayalam 13,380,109 (4.1 p.c.); Oriya 13,153,909 (4.0 p.c.); Assamese 4,988,226 (1.5 p.c.); Kashmiri 51,086; Sanskrit 555.

The constitution of 1950 also declared that English was to be replaced within 15 years as the official administrative language by Hindi in the Devanagari script. In higher education English was, wherever possible, to be replaced by the provincial language or by Hindi.

EDUCATION. According to the census of 1951, less than one in six of the population was literate, literacy among men being about three times as common as among women, and the towns showing a higher proportion of citizens who could read than the country. Schools are arranged in four grades—nursory, primary, middle, and high, and in some states primary education is compulsory and the aim of the Indian govt., as it was of the British, is to make this universal; children spend four to six years in this grade. The middle stage lasts from two to four years, and English is an optional subject. In the high school stage, two to four years long, English is a compulsory subject, but is being replaced as a medium of instruction by the local or regional language

which in the lower grades is the common, and in the primary the only, medium. There are schools for training teachers, and for special subjects, *e.g.* engineering, medicine, agriculture, schools for adults and for those who are physically or mentally handicapped. University education is available in all states, the total number of universities in 1957 being 33. Of these, the oldest, those of Calcutta, Bombay, and Madras, all dated from 1857; 15 had been founded during 1947-57. The Universities of Allahabad, Benares, Osmania, Aligarh, Lucknow, Delhi, Annamalai, Baroda, Roorkee, Visva Bharati, and Sri Venkateswara offered residential facilities.

CONSTITUTION. The U.K. Government of India Act of July 18, 1947, decreed that sovereignty over the territories until then included in British India should be transferred to the two dominions of India and Pakistan, the new Union of India to comprise the former British provinces of United Provinces, Bihar, Bombay, Central Provinces, Orissa, Madras, and Assam, plus the west of Bengal with Calcutta, and the east of Punjab. New Delhi continued as the capital. Lord Mountbatten, last British viceroy, was appointed governor-general, and on Aug. 15, 1947, administered the oath to Pandit Jawaharlal Nehru as the first prime minister, and his cabinet. During 1947-50, all the princely states lying within the territories of the union adhered to India.

A specially convened conference of Commonwealth premiers in London in April, 1949, agreed to India's continuing to be a member of the Commonwealth with the status of a republic; and on Jan. 26, 1950, a constitution came into effect declaring India a sovereign democratic republic, a union of the states of Assam, Bihar, Bombay, Madhya Union, Madras, Orissa, Punjab, Uttar Union, W. Bengal (all former governors' provinces, now called Part A states); Hyderabad, Madhya Bharat, PEPSU (Patiala and East Punjab States Union), Rajasthan, Saurashtra, Travancore-Cochin (all former princely states, now Part B or rajpramukh states); Ajmer, Bhopal, Bilaspur (Punjab), Coorg, Cutch, Delhi, Himachal Union, Manipur, Tripura, Vindhya Union (all former chief commissioners' provinces, now Part C states); and the territories of the Andaman and Nicobar Islands. The status of Kashmir was undecided. To

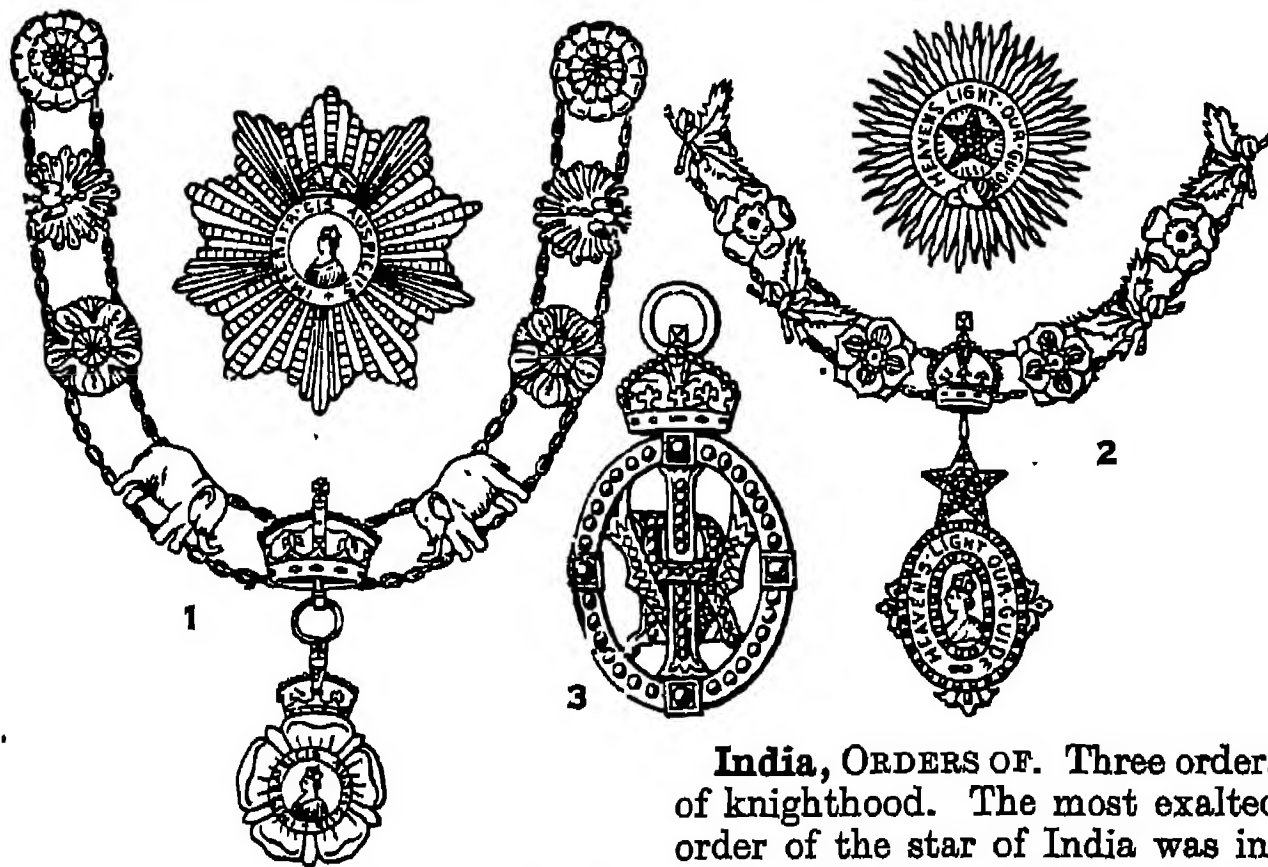
these states another was added: Andhra, carved out of Madras, inaugurated on Oct. 1, 1953; and in 1954 Bilaspur was merged with Himachal Union.

The constitution abolished untouchability; established adult suffrage, a lower house, Lok Sabha (house of the people) of 500 members elected for five years on a territorial basis, and an upper house, Rajya Sabha (council of states) of 250, one-third to retire every second year. It allotted powers and legislation between the central government in Delhi and the states. Rajendra Prasad (b. 1884) was elected unopposed first president of the republic.

New communal violence in Assam and Bengal in Feb., 1950, and large-scale migrations between the two countries of India and Pakistan led to a meeting between the two premiers in April, and an agreement for mutual care and assistance to minorities. The dispute with Pakistan over Kashmir (*q.v.*) continued, with sporadic incidents. Of the last French possessions in India, Chander-

Saurashtra and part of Hyderabad but lost other areas. When the new organization came into force on Nov. 1, 1956, the states were Punjab, Uttar Union, Bihar, West Bengal, Assam, Rajasthan, Madhya Union, Orissa, Bombay, Andhra Union, Mysore, Kerala, and Madras. The Andaman and Nicobar Islands, Delhi, Himachal Union, the Laccadive and Amindivi Islands, Manipur, and Tripura were made into centrally administered territories. The office of rajpramukh, occupied in the groups of princely states formed 1947-50 by one of the former rulers, was abolished.

Select bibliography. Times of India Directory and Year Book (annual); India, a reference annual (Govt. of India ministry of information and broadcasting); Independence and After (speeches), J. Nehru, 1949; India since Partition, A. Mellor, 1951; The Economic Development of India, V. Anstey, 4th ed. 1952; Our India, M. R. Masani, 1953; A Survey of Indian History, K. M. Panikkar, 1954; The Constitution of India, G. N. Joshi, 3rd ed. 1954.



Indian Orders. 1. Collar, badge, and star, Indian Empire. 2. Star of India. 3. Badge, Crown of India

nagore was transferred to India in 1950, Pondicherri, Karikal, Yanam, and Mahé in 1954. Indian demands for the Portuguese territories of Goa, Daman, and Diu, insistent during 1953-56, were then dropped.

In 1956 came a major reorganization of the states based in the main on linguistic considerations and the abolition of all reminders of the former princely states. Hyderabad, PEPSU, Saurashtra, Madhya Bharat, and Travancore-Cochin disappeared; Madras was further reduced in size; Andhra was increased; Bombay gained

India, ORDERS OF. Three orders of knighthood. The most exalted order of the star of India was instituted by Queen Victoria in 1861 for bestowal upon Indian rulers and upon British subjects for services to the Indian empire.

The most eminent order of the Indian empire and the imperial order of the crown of India were instituted by Victoria in 1878, to mark her assumption of the imperial title. Award of the imperial order of the crown of India was restricted to wives and female relatives of Indians or of viceroys, governors, and principal secretaries for India.

Indiana. North-eastern state of the U.S.A. With Ohio to the E. and Illinois to the W., it lies S. of Lake Michigan, on which it has about 50 m. of coast. Its area is

36,291 sq. m. The surface is mainly an undulating plain, but attains some elevation along the Ohio valley, in which is Wyandotte Cave, with oolitic limestone used for building. Most of Indiana is drained by the Wabash (which forms part of the W. boundary) and its affluents, and by the Ohio, a natural S. frontier.

Indiana ranks high among the states for income from farm products and as a grower of maize. Crops and fruit include wheat, oats, rye, hay, tobacco, soya bean, potatoes, onions, tomatoes, apples, pears, peaches, and grapes. Stock raising and dairy farming are carried on. Two-thirds of the nation's peppermint and spearmint oil is yielded.

But this is predominantly a manufacturing state, with the Calumet region, including the lake ports and the steelworks of Gary, East Chicago, Hammond, and Whiting, one of the world's greatest industrial centres. Freighters bring iron ore from Michigan to artificial harbours in the Great Lakes, and carry away pig iron, limestone, Portland cement, coke, and the finished products of the steel mills. Oil refineries, machine shops, railway works, and the manufacture of agricultural machinery and motor cars employ many. Refrigerators, wireless sets, gramophones, pumps, furniture, and clothing are made, and there are meat-packing plants and flour mills. Mineral resources include coal and natural gas. Water transport is provided only on the Ohio, lower Wabash, and part of the White river, but there are 6,716 m. of rly., 16 lines radiating from the capital, Indianapolis.

Higher education is provided at the state university of Bloomington and at Purdue, De Pauw, Valparaiso, and Notre Dame (R.C.) universities. Two senators and 11 representatives go to congress. The "Hoosier state" was settled in 1732, made a territory in 1800, and joined the Union, Dec. 11, 1816. Pop. (1950) 3,934,224. *Consult* History, L. Esarey, 2 vols., 1924.

Indian Air Force. Indian military air unit formed in 1932. The first squadron was fully trained and equipped in 1939, and a number of first line fighter and reconnaissance units, their personnel in large part Indian, went into action on the Burma front. The prefix Royal was granted to the I.A.F. in March, 1946, but was abandoned in 1950. It was announced at the time of the partition of India (Aug., 1947) that the

air strength of the country would be divided. The dominion of India took over seven fighter squadrons and one transport squadron; and Pakistan one fighter and one transport squadron, with another fighter squadron to be formed as soon as possible.

Indianapolis. Largest city of Indiana, 23rd largest in the U.S.A. It is the state capital and the co. seat of Marion co. Situated on White river, 110 m. N.W. of Cincinnati, Indianapolis is the largest city of the U.S.A. not on a navigable body of water. It is on the most direct E.-W. air line route and has five airports, also 16 rly. routes, all of which are interconnected, and two coast-to-coast motor coach systems.

Indianapolis is one of the best-planned cities of the U.S.A., with broad, tree-lined streets, and parks covering more than 3,200 acres. Most of the public buildings are of limestone quarried in the state; they include the capitol, the state house, and public library. Indiana university, Butler university, and the Jordan conservatory of music are among educational institutions. At Speedway City, a manufacturing town within the city, is the Indianapolis motor speedway, the

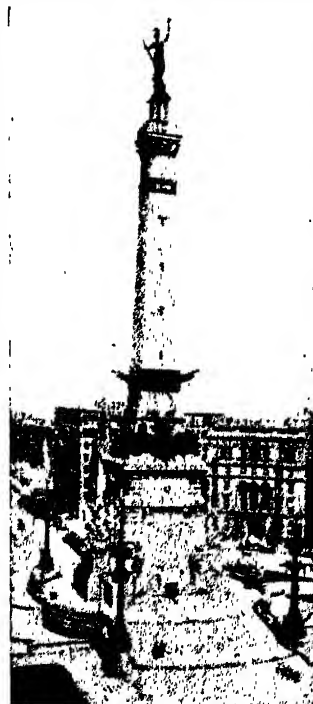
scene of the annual international 500-m. motor race held May 30.

Indianapolis is a distributing centre for livestock, grain, and meat, and one of the chief manufacturing centres in the country, producing rly. rolling stock, aircraft engines, motor car parts, wireless sets, gramophones, furniture, machinery, silk stockings, and pharmaceutical goods. Chosen as the site of the capital in 1820, it was incorporated 1832, chartered as a city 1847. Pop. (1950) 427,173.

Indian Army, THE. Military formation dating from the Bengal, Madras, and Bombay armies of the E. India Co. Under the co. the officers were supplied by the co.'s military college at Addiscombe, Surrey, or by direct appointment. The total strength, including local and irregular troops, was some 38,000 Europeans and 350,000 Indians.

After the Mutiny, the East India Co. ceased to rule, Sept. 1, 1858, and the army became a part of the forces of the British crown. The local European corps were abolished; the artillery became wholly British, except for a few mountain batteries; and the number of Indian troops was greatly diminished. In 1861 the Indian staff corps was formed to provide a body of officers for service in India. In 1863 the system prevailing in the Punjab frontier force was applied to the whole army, seven British officers being attached to each unit to carry out the higher regimental duties. Many other reforms were effected between 1885 and 1904, the term Indian staff corps being replaced by that of Indian army in 1903.

Under Lord Kitchener the whole army was reorganized, and recruits were more definitely sought from the martial stocks, the principal classes and peoples enlisted being Punjabi Muslims, Sikhs, Pathans, Dogras, Jats, Mahrattas, Rajputs, Madrassis, Gurkhas, and Garhwalis. The Gurkhas, who provided 20 battalions in peacetime, are not Indians and have very little in common with the inhabitants of India, whom they heartily despise. After the breakdown of the Indian army administrative services in the field during the First Great War, the supply, remount, and ordnance services were placed on the same footing as that prevailing in other armies. In 1914 Indian army troops were sent abroad to Mesopotamia, East Africa, Egypt, and France. In



Indianapolis. Soldiers' and sailors' monument in Circle Place, 285 ft. in height

1919 came the 3rd Afghan War of a few weeks' hard fighting, and then three years of operations on the N.W. Frontier, followed by another reorganization. Almost half the cavalry was abolished; the Carnatic and Pioneer regiments were disbanded in 1923 and 1932 respectively; and a reduction of several thousand was made in the number of men of the British army to be maintained in India. The army was divided into four commands, and the troops holding the frontier were kept fully mobilised. In addition the Peshawar, Rawal Pindi, Quetta, Mhow, and Meerut divisions were considered to be field army formations. Motor transport companies were formed. The infantry of the famous corps of guides was absorbed into the infantry of the line. The cavalry regiments were reduced from 39 to 21, and the infantry battalions increased from 129 to 140.

In Oct., 1918, Indians were admitted to commissions with the

was also the problem of replacing the skilled tradesmen serving in technical arms.

In 1947 the army was divided between the newly created dominions of India and Pakistan, 15 infantry regiments being transferred to India and 8 to Pakistan, 12 armoured corps units to India and 6 to Pakistan; 18½ artillery regiments to India and 8½ to Pakistan, and 61 engineer units to India and 34 to Pakistan. Eight of the Gurkha battalions continued to serve in the British army. See Gurkha.

Indian Bean OR CATALPA (*Catalpa bignonioides*). A tree of the family Bignoniaceae. A native of N. America, it has large heart-shaped leaves in whorls of three. The fine, bell-shaped flowers are white, spotted with yellow and purple, and borne in large, pyramidal clusters of a hundred or more. The seed capsule is very long, suggesting a bean-pod, and contains numerous seeds with fringed wings.

Indian Civil Service.

Former organization for the civil administration of British India. For the higher posts, recruited by open competitions held every summer, natives of India were eligible: the limits of age were 22-24. Competition was keen, but success was attainable with a good general education and proficiency in classics, modern languages, mathematics, mental and moral science, or physical or natural sciences. Sound health was an essential condition. Successful candidates, having spent a year at a university, receiving £200 to defray the cost, were examined in Indian law and history and a native language, and in riding. In the administrative branch prospects might extend to the control of a province, and in the judicial to a judgeship in the Indian high court. Civil administration in India was reorganized after the creation of the dominions of India and Pakistan in 1947.

Indian Club. Wooden club, partly bottle-shaped, used in gymnastic exercises. Made of willow, elm, maple, or other wood, it averages about 2 ft. in length, and weighs 2 to 4 lb. The clubs are normally used in pairs.



Indian Cress. Leaves and flowers of the nasturtium

Indian Corn. Term of U.S. origin for the cereal known in the U.K. as maize. See Maize.

Indian Cress (*Tropaeolum*). Genus of annual and perennial twining herbs of the family Tropaeolaceae. They are natives of S. America. The handsome, irregular flowers end backwards in a long, nectar-containing spur. The few large

seeds are each separately enclosed in a thick, ultimately spongy rind. The favourite nasturtiums of gardens are *T. majus* and *T. minus*, and the canary creeper is *T. peregrinum*. Green fruits of the first two are used as substitutes for capers. *T. tuberosum* has an edible tuberous root.

Indian Cup (*Sarracenia purpurea*). A perennial herb of the family Sarraceniaceae, native of N. American bogs. The leaf-stalks are hollowed out to form erect, trumpet-shaped pitchers, with a wing down one side, and the real leaf forms an arching, but never closed, lid. Within the mouth of the pitcher a sweet fluid is excreted, below that is a band of polished surface, and lower still a fringe of downward pointing hairs. Insects enter to sip the sweet fluid, and, venturing farther, lose their foothold on the polished surface and fall into the lower part of the pitcher, which is filled with a



Indian Cup. Hollowed leaf-stalks in which insects are trapped

clear fluid exuded by the plant. Climbing out is all but impossible owing to the fringe of hairs; and all but the newest pitchers show a thick deposit of decomposing insects at the bottom. The proteins dissolved out of these victims are absorbed by the plant. The large, solitary purple flower is borne on a tall leafless stalk. Another species (*S. flava*) has pitchers 2 ft. long.

Indian General Service Medal. Campaign medal instituted in 1854 at the suggestion of Lord Dalhousie for Indian troops and British troops serving in India. Originally awarded for service in the Burmese war of 1852-53, it



Indian Bean, a North American tree

same status as British officers. The Indian military academy, at Dehra Dun, was established in 1931. No Indian officers were commissioned in the Gurkha regiments, whose Gurkha officers received their commissions from the viceroy, thus having a status below that of British officers. The Indian artillery was revived as field artillery in 1935; and the mechanisation of the cavalry was begun in 1938. In the Second Great War units of the Indian army served in France, Malaya, Burma, Iraq, Persia, Syria, Palestine, Greece, N. and E. Africa, and Italy. With the formation of an interim Indian government in 1946, the entry of British officers into the Indian army ceased, and all British troops were removed from Indian formations. The contracts of British officers serving with the Indian army terminated with the end of the Indian Empire, Aug. 15, 1947, and by Jan. 1, 1948, less than 300 British officers remained. There

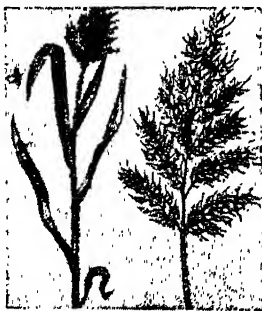
was issued for campaigns and expeditions until 1895; appropriate clasps were provided for each campaign, some 23 in number. In 1895 a new medal was authorised with a ribbon of red and green in five equal stripes. This was replaced by the medal of 1908, which had a green ribbon with a blue central stripe. In 1936 a fourth Indian general service medal began to be awarded to British and Indian troops serving on the North-West Frontier. The obverse carries a crowned effigy of the king, and the reverse a tiger and view of the frontier. The ribbon has a broad central stripe of khaki flanked by thin red stripes and edged with green. The Indian general service medal was not awarded after Aug. 15, 1947.

Indian Ink. Specially prepared form of black ink. It is also called China ink, in which form it is sold in cakes or sticks and moistened with water for use. The chief constituent is lamp-black mixed with a thin glue. It produces an absolutely black and imperishable mark. See Ink.

Indian Medical Service. Former British military and civil service in India. Its history goes back to the appointments of surgeons by the East India Company. In 1896 the Indian Medical Service was created by the amalgamation of the three "establishments" of Bengal, Madras, and Bombay. In 1853 appointment was opened to Indians. Entrance was by competitive examination. Officers were posted to military, chiefly regimental, duty, or to civil employment, e.g. surveillance of prisons, inspection of sanitation, vaccination, etc.; attendance on civil officers in the district; or work in medical colleges or research depts. Following the establishment of the dominions of India and Pakistan in 1947, the Indian Medical Service was reorganized.

Indian Millet

(*Sorghum vulgare*). Grass of the family Gramineae, native of Asia. It has long, flat leaves, and a much branched, loose panicle of flowers. The large, round, hard seeds when ground yield an excellent white flour, which, in the warmer parts of Europe and in Asia, takes the place of oats and barley.



Indian Millet, Left, stalk and leaves; right, flower-head

Indian Mulberry (*Morinda*). Genus of shrubs and trees belonging to the family Rubiaceae. They are natives of the tropical regions of Asia and Australasia. They have



Indian Mulberry. Leaves, flowers, and berries of *Morinda citrifolia*

opposite (occasionally whorled) leaves and small flowers in dense heads. The small berries are edible, but insipid. The roots and bark produce red and crimson dyes.

Indian Mutiny. Name popularly given to the great revolt which broke out in India in 1857, because the struggle began with mutinies among the native regiments, though its continuation was by no means confined to them. The highly complex causes are traced in the article on India. The uneasiness then prevailing among the native princes and people and the disaffection among the native regiments were not realized by the British authorities, whose white troops, moreover, were just then reduced in number as a result of the Crimean War.

The actual occasion of the mutiny was an ill-advised order by the government that in future enlistment in the Bengal army was to carry with it obligation to serve overseas, though crossing the seas was forbidden under severe religious penalties to high-caste Hindus, who formed a large proportion of these sepoy armies. To this was added the blunder of ordering the issue of greased cartridges in which the fat of pigs and cows had been used, the pig being unclean to the Mahomedans and the cow sacred to the Hindus. When the blunder was discovered, an unobjectionable grease was substituted, but the sepoys

would not believe this. Between Jan. and May, 1857, isolated mutinies of regiments who refused to use the new cartridges were suppressed. But on May 10 a great group of native or sepoy regiments stationed at Meerut broke out, murdered their officers, and marched upon Delhi, where the Mahomedans proclaimed the restoration of the Mogul Empire. This probably restrained reigning Hindu princes who might otherwise have joined the revolt, since they had no wish for Mahomedan domination.

The revolt was, in fact, virtually confined to Hindustan, the territories through which the Ganges and its tributaries flow, above Patna on the border of Bengal proper. Here were many regiments of sepoys and thousands of the soldiery of the recently annexed kingdom of Oudh, besides the troops of semi-independent princes, but few of the queen's army. Outside this area mutinies were only sporadic, though it was long doubtful whether the disaffected elements could be held in check. The residency buildings at Lucknow, in Oudh, were held by a mixed force of white soldiers and loyal sepoys, and sheltered a crowd of civilians and white women and children. A small group of whites held out desperately for some weeks at Cawnpore, before which great rebel forces were collected under a Hindu magnate, Nana Sahib. But the main rebel force was at Delhi; and on the Ridge facing Delhi was gathered the main body of white troops and loyal sepoys.

Cawnpore surrendered on June 26. Most of the garrison were treacherously massacred when embarking to go down the Ganges under a safe-conduct; the women and children were held prisoners and were later butchered on the approach of Havelock's relieving force. On June 30 the massed mutineers began the siege of the Lucknow residency. The British on the Ridge besieging Delhi were themselves practically besieged. A handful led by Sir Henry Havelock made a dash for Cawnpore from Bengal, but were too late to save the garrison in spite of repeated victories in the face of almost overwhelming odds. Though Havelock struck into Oudh he was forced to fall back to Cawnpore and await reinforcements, while the Lucknow garrison held out.

At last, when John Lawrence from the Punjab was able to send help to the Ridge, John Nicholson fell, on Sept. 14, in the storming

of Delhi, which was completely mastered the next week. On Sept. 15 Havelock was joined by Outram, and on Sept. 25 they fought their way to Lucknow, and reinforced the garrison. Sir Colin Campbell (Lord Clyde) had now arrived to take the supreme command in India; fresh troops from home were accumulating. The tide had turned. On Nov. 17 Campbell relieved Lucknow, placed a strong garrison in the neighbouring fortress called the Alambagh, and then proceeded with the campaign of subjugation N. of the Ganges. Early next year Sir Hugh Rose opened the central Indian campaign in the revolted districts S. of the Ganges, and after the fall of Jhansi in June, there remained only the suppression of guerrilla bands. By the end of 1858 the last embers of the revolt were stamped out. See India: History.

A. D. Innes
Bibliography. History of the Indian Mutiny, J. W. Kaye and G. B. Malleson, 1888-89; T. R. E. Holmes, 5th ed. 1898; Sir G. W. Forrest, 1904-12.

Indian Navy. Naval forces of the Union of India. The first organized navy to be formed in the country was the Honourable East India Company's Marine formed in 1612 to defend its interests in

East Indian waters. In 1686 its title was changed to the Bombay Marine, and in 1830 it became the Indian Navy. Reorganized in 1892, as the Royal Indian Marine, in 1934 it became the Royal Indian Navy under the command of a flag officer of the Royal Navy. Its ships flew the white ensign and its officers served in British as well as Indian ships.

During the Second Great War most of its ships, several built in Indian dockyards, were escort and patrol vessels, minesweepers, and submarine chasers. Units served against Italian Somaliland and Eritrea, and in Persian, Burmese, and Far Eastern waters.

A serious mutiny broke out among the ratings in Bombay on Feb. 19, 1946, and lasted some days, spreading to Karachi and Calcutta before it was suppressed by force of arms.

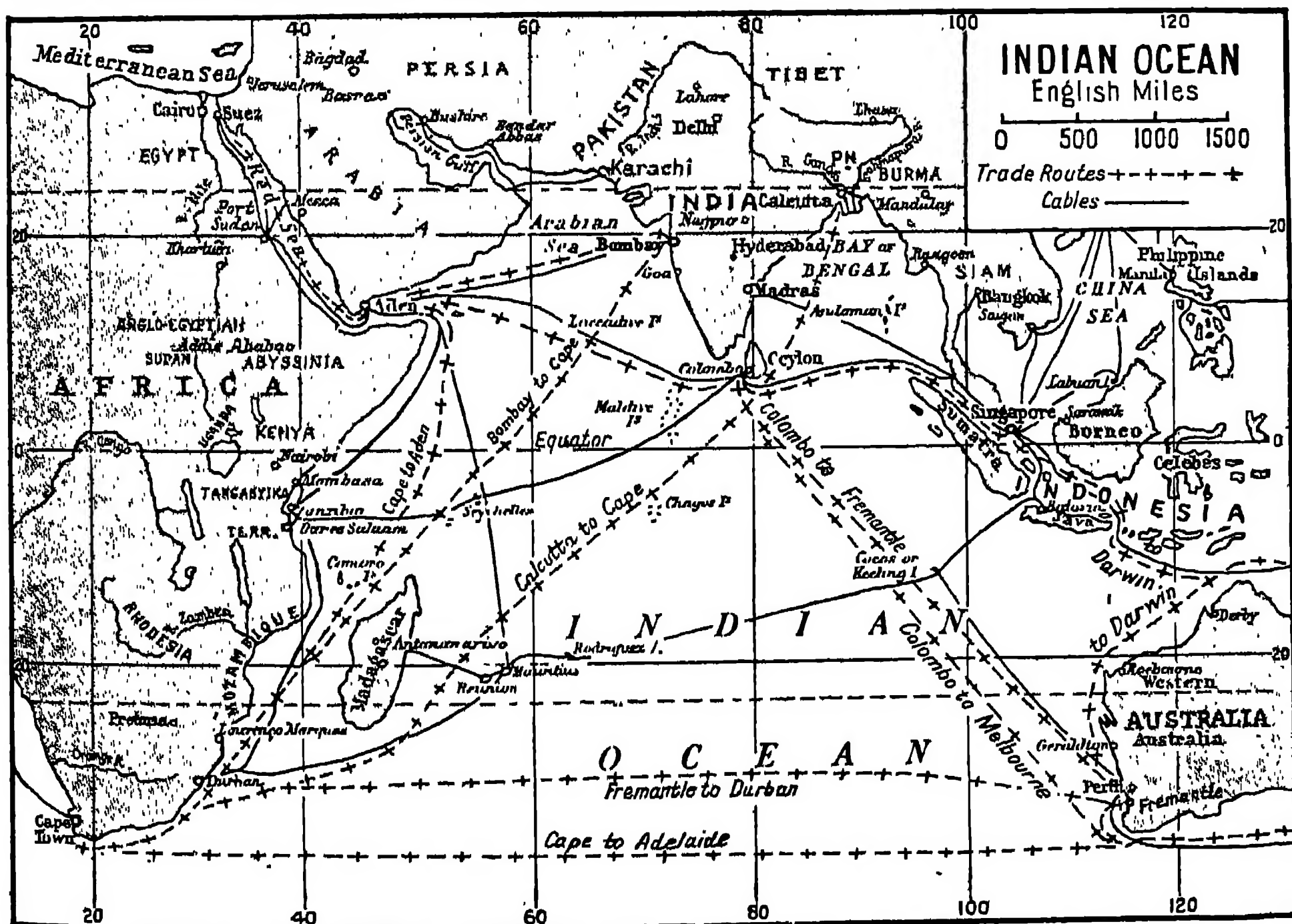
Indianisation of the navy proceeded rapidly after Aug. 15, 1947, all ships being officered by Indians by Jan 1, 1948. The prefix Royal was dropped in 1950.

When the dominions of India and Pakistan were formed in Aug. 1947, vessels of the Indian navy were divided between the new states, one-third of their total strength going to Pakistan and two-thirds to India.

Indian Ocean. One of the great oceans of the world. The depth conditions are fairly uniform, for about two-thirds of the total is covered by water of over 2,000 fathoms. In four areas depths exceeding 3,000 fathoms are attained; they lie near the E. margin of the sea. To the N. and W. are many islands, rising from submarine ridges which have a general N. to S. direction.

The most important of the islands are Madagascar and Ceylon, but there are many small coral groups. Southwards a large area of less than 2,000 fathoms in depth helps to mark a distinction from the South Seas. The E. part of the Indian Ocean is remarkable for its vast unbroken expanses of water, interrupted only by the Cocos group and Christmas Island. The S.E. trade crosses the equator during the northern summer to become the S.W. monsoon, and the N.E. trade in the opposite season is similarly deflected. See Monsoon; Ocean.

Indian Order of Merit. Military and civil decoration awarded up to 1947 by the British govt. to Indians for gallantry. It was instituted in 1837 for conspicuous bravery in action by officers and men of the Indian army. There were originally



Indian Ocean. Map of the tropic sea showing the trade routes and cable lines connecting Australia, Asia, and Africa

three classes, but the highest was abolished in 1902 when Indian troops became eligible for the V.C.



Indian Order of Merit, star and ribbon

The military division has two classes, appointments to the first being made only from members of the second. The badge of the first class is a silver eight-pointed star with a centre of crossed swords in gold

and the inscription Reward of Gallantry; the second class has the centre inscription in dark blue enamel. Both classes of the military order are worn suspended from a dark blue ribbon with red edges. The badge of the civil division, awarded for gallantry in aid of the public authority or the safety of others, is a silver eight-pointed star with a centre of dark blue bearing a wreath and the inscription For Bravery in gold. It is worn from a ribbon of dark red with blue edges.

Indian Red. Natural red earth imported from Bengal. Originally brought from the Persian Gulf, and so sometimes known as Persian red or terra Persica, its colour is due to the presence of sesquioxide of iron in the earth. Of great staining power, it is used to make industrial paint.

Indian Reservation. An area in N. America set aside for the American Indians. The reserve system, founded on the principles of segregation and guardianship for the Indians, provided for communal ownership of the land, with administration by an agency of the federal government which could lease timber and mineral resources for the benefit of the tribes. The Dawes Act of 1887 allowed individual Indians to acquire and develop allotments. Congress in 1924 conferred citizenship on all the Indians, but not all are permitted to vote, since the separate states fix conditions. Reservations in 25 states, mostly in the W. and S.W., now comprise about 56,000,000 acres; the Navajo Reservation covers 25,000 sq. m. in Arizona, Utah, Colorado, and New Mexico. The office of Indian affairs has under its jurisdiction 393,622 Indians in the U.S.A. and 32,750 Indians, Eskimos, and Aleuts in Alaska.

In Canada, where a similar policy has been followed, the territory set

aside for the Indians amounts to 5,570,951 acres. There are reservations in all the provinces, the most extensive being in Ontario, Saskatchewan, and Alberta. The department of mines and reserves is responsible for them. Pop. 125,686. See American Indians.

Indian Service Medal. Instituted by King George VI on June 6, 1946, for personnel of the Indian army, navy, and air force who had served for three years in non-operational theatres of war. The medal is worn from a dark blue ribbon having light blue stripes. Recipients are not eligible for the Defence Medal (*q.v.*).

Indian Summer. Term used to denote a period of summer-like weather occurring in autumn. Although markedly warm weather is not exceptional at this time, there is no evidence that such a spell tends to recur regularly. The term originated in the U.S.A. A warm spell about Oct. 18 is sometimes referred to as S. Luke's summer, and one about Nov. 11 as S. Martin's summer, from the respective saints' days.

Indian Territory. A former territory of the U.S.A., now included in the state of Oklahoma.

It constituted part of the Louisiana Purchase, and in 1829 was assigned by congress as the domain of Indians living E. of the Mississippi. Cherokees, Creeks, Choctaws, Chickasaws, and Seminoles began to move hither in 1833. The tribes occupied distinct portions of the territory, and were granted the right of self-government. Each tribe appointed a principal chief or governor, and had a legislature, national court, and other institutions based more or less on the state system, while an international council consisting of representatives of each tribe met periodically.

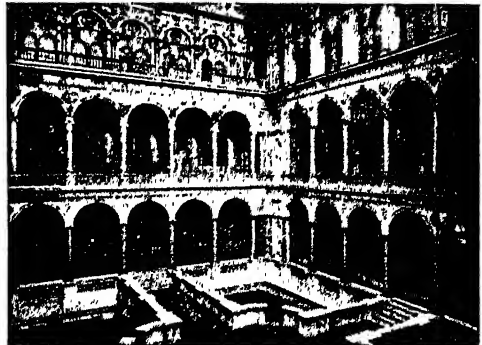
With the advent of white settlers it became necessary to modify this form of government. In 1897 the U.S.A. assumed jurisdiction over the courts, and in 1898 authority over property. By 1906 communal ownership had been abolished in favour of individual possession. In 1905 an overwhelming vote of the inhabitants was

cast in favour of statehood, but in 1907 the territory was joined with Oklahoma territory to form the state of Oklahoma. The pop. then was 681,115 (101,200 natives). See Oklahoma.

India Office. Former department of the British government. When the Government of India Act of 1858 transferred to the crown the functions of the East India Company and the board of control, a new department of the home civil service, the India office, was created under a secretary of state. Designed by Sir Gilbert Scott, the building housing the India office was opened 1867. It has frontages to King Charles St., S. James's Park, and Whitehall.

The India office was responsible for all such business connected with Indian public affairs as was transacted in the U.K. At first its cost was defrayed entirely from Indian revenues; the Treasury later made a contribution.

The Government of India Act, 1919, provided for the appointment in London of a high commissioner, whose functions were to take over on behalf of the Indian Government that work of the India office which was in the



India Office. Central court of the government building in Whitehall which housed the India office from 1867 to 1947

nature of agency, as distinct from administrative supervision and control. The high commissioner dealt with trade, pay, and pensions of Indian officials in England, sale of publications, education and welfare of Indian students abroad, and represented India at international organizations. The India office remained the channel of communication between the British and Indian governments, and the secretary of state, assisted by a parliamentary and a permanent under-secretary, continued to be the agent of the crown. The governor-general and the governors of provinces were responsible to him for the exercise of their special

powers. Upon the granting of dominion status to India and Pakistan in 1947 the India office was abolished. The building was taken over by the Commonwealth Relations and Foreign offices.

India Rubber Plant (*Ficus elastica*). Large evergreen tree of the family Moraceae, native to Indonesia, with glossy, oblong, leathery leaves. Introduced from India in 1815, it has since been cultivated extensively in a young condition, as a decorative perennial for the warm greenhouse, as a table plant, and for sub-tropical gardening, the pots of large specimens being sunk in the ground in summer. If the plant is kept in unheated rooms in winter its leaves will drop off.

A suitable compost consists of sandy loam three parts to one part of leaf-mould. Tall, "leggy" plants should have the growing-point nipped out. This induces a more bushy growth, and the resulting side-shoots may be used for propagation, after they have become firm at the base. Shoots at least 6 ins. long should be selected for the purpose, and if taken off with a "heel" soon root in the greenhouse. Table plants should be given at frequent intervals a few days in the lighter and moister atmosphere of the greenhouse, and should have their leaves sponged with tepid water to remove dust. In spite of the impression that is produced by its name—that this is the India rubber plant—its product is much inferior in quality to that of *Hevea* (Para rubber) and many other plants. See Rubber.

Indicative (Lat. *indicare*, to point out). In grammar, one of the modes or moods of the verb. It expresses the action as a fact positively or interrogatively or negatively. In inflexional languages the different moments of time are denoted by the present, past, or future tense, the person of the agent by pronominal suffixes; in analytic languages, such as English, by vowel-change or periphrasis and separate pronouns. See Grammar.

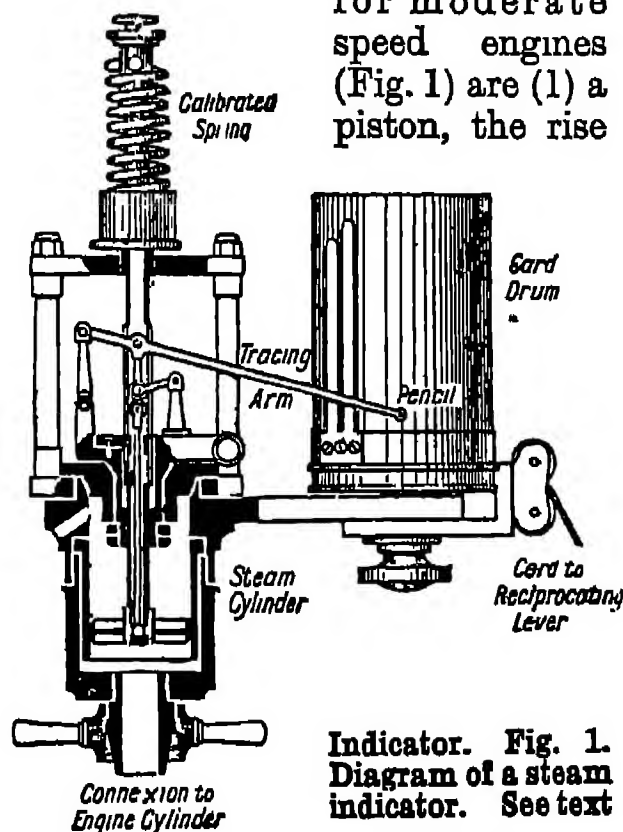
Indicator. Any instrument which indicates or records variations in the magnitude of an observed quantity, e.g. pressure



India Rubber Plant. Greenhouse specimen of the E. Indian tree

of the engine can be calculated, but from the diagram obtained useful conclusions can also be drawn in regard to the working of the engine, e.g. defects in valve setting, losses due to restricted exhaust.

The main parts of an indicator for moderate speed engines (Fig. 1) are (1) a piston, the rise



Indicator. Fig. 1. Diagram of a steam indicator. See text

of which is resisted by a calibrated spring, so that the rise of the piston is proportional to the pressure in the cylinder; (2) a system of levers giving a vertical rise of the pencil which is a magnified copy of the rise of the piston; (3) a drum to which a rectangular sheet of paper (or "card") is clipped. The drum is rotated backward and forward by a cord, one end of which is attached to a reducing gear, so that the motion of the drum is a reduced

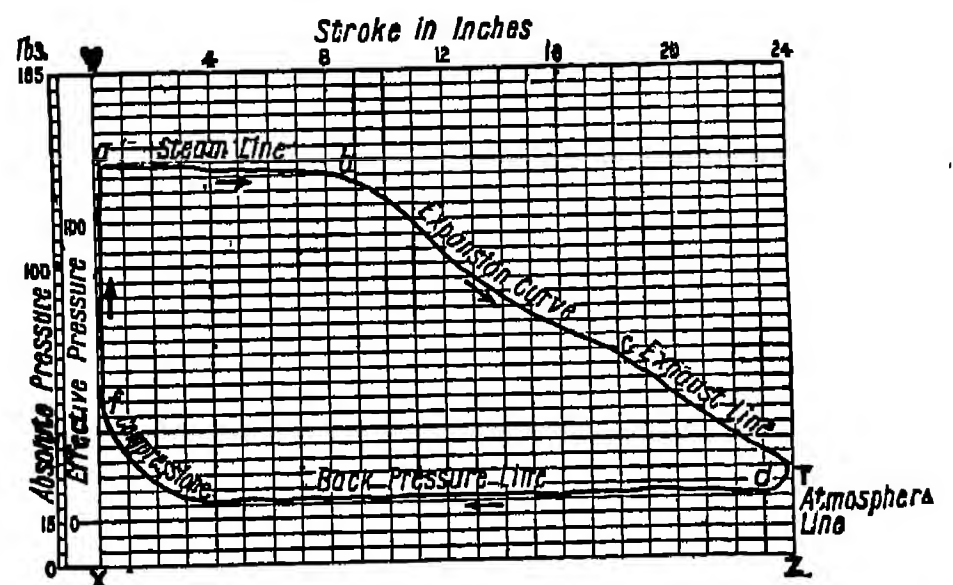
copy of the motion of the engine piston. The pressure cylinder is connected as directly as possible to the end of the cylinder from which a diagram is required.

Fig. 2 is a steam engine indicator diagram or "card" of a single stroke and return, as it appears when detached from the drum and laid out flat. Dimensions in the vertical direction (X-Y) are proportionate to the pressure on the spring, which has a known resistance; those in the horizontal (X-Z) direction to the known travel of the working piston.

At the beginning, *a*, of the stroke, when the pressure in the working cylinder is greatest, the pencil is raised to its highest point. The slight fall between *a* and *b* is due to the gradual throttling by the slide-valve of the steam as the piston moves forward. At *b* steam is cut off entirely; and the line *b c* shows the gradual fall in pressure while the steam is working expansively. At *c* the exhaust port opens just before the end of the stroke, and pressure falls to slightly above atmospheric, and so remains during the return stroke until *e* is reached, when the exhaust valve shuts. The trapped steam is compressed—as shown by the rise of curve from *e* to *f*—and "cushions" the piston.

The mean effective pressure can be ascertained either by a system of mid-ordinates or indirectly by use of a planimeter which measures the area of the diagram. This area divided by the length of the diagram gives the mean height, from which the mean effective pressure is deduced.

Horse-power developed in one end of the cylinder is calculated on the formula $P L A N / 33,000$, where *P*=mean effective pressure in lb. per sq. in.; *L*=length of stroke in ft.; *A*=area of piston in sq. ins.; *N*=number of working strokes per min. The useful h. p. delivered, known as brake horse-



Indicator. Fig. 2. Diagram showing variation in pressure in a steam-engine cylinder with the travel of the piston. Divisions on scale of 5 lb. pressure. See text

power (b.h.p.), is the difference between indicated h.p. and friction h.p. (f.h.p.), and is measured by means of a friction brake or other form of dynamometer.

At slow speeds the pencil of the indicator more or less follows the pressure variations, but at high speeds the pencil mechanism oscillates, forming ripples which distort the diagram, even with very light moving parts, so that the diagram is no longer a correct record of pressure variations in the engine cylinder. A sudden rise of pressure during combustion, such as occurs in the cylinder of an internal combustion engine, will cause the pencil to indicate too high an initial pressure, and the diagram may be distorted for an appreciable portion of the stroke. The type of indicator shown in Fig. 1 is unreliable for these and other reasons with speeds exceeding 200 r.p.m., but smaller indicators with very light moving parts are fairly reliable up to 300 r.p.m. Beyond this a different type of indicator must be used.

In one type suitable for high speeds, the Farnborough, a light disk is subjected on one side to the varying pressures in the cylinder and on the other to the pressure of compressed air, which can also be varied. When the pressure in the cylinder is very slightly greater than that of the compressed air, the disk rises from its seat and closes an electrical circuit, generating a spark between the pencil and a drum rotating at engine speed. A sheet of paper fastened to the drum is perforated by this spark. The compressed air also presses on a spring-controlled piston which moves the pencil axially, so that the distance of the pencil from its zero position is proportional to the air pressure on the piston (and therefore on the disk).

The circumferential distance from the dead centre position is proportional to the angular movement of the crank, so that the diagram for an internal combustion engine is similar in shape to Fig. 3. AB is the compression line; at B

ignition begins and the pressure rises rapidly to C; combustion continues from C to E; EF shows the fall of pressure during the expansion stroke.

This diagram, however, has a time base instead of a stroke base and, while it is of considerable value for studying the ignition process and heat losses, it is not suitable for ascertaining indicated h.p. until it is converted by a somewhat laborious process. The friction h.p. of a high-speed engine can, however, be obtained in other ways, and the brake h.p. can be measured directly (*see* Horsepower) so that the above disadvantage is not serious.

Another type of indicator used for high-speed engines is the cathode ray indicator, in which a fine pencil of electrified particles produces a spot of light at the end of an evacuated glass tube, this pencil being deflected according to the pressure in the engine cylinder. A diaphragm which deflects and alters the capacity of an electrical condenser, or a carbon pile, the resistance of which alters with the pressure, is used to produce the deflecting current. Deflection in a direction at right angles to the pressure deflection is produced by an armature rotating at the same speed as the crankshaft. A diagram similar to Fig. 3 is produced, and this can be traced or photographed. The instrument has a number of uses, *e.g.* recording variations of pressure in fuel systems or in pipe lines, examination of exhaust pulses.

Chemical indicators are substances that mark a particular stage in a chemical reaction by some sharp and easily observed change in appearance. For example, certain organic dyes change colour according to whether they are in an acid or basic solution: *e.g.* litmus, which turns red in acid, blue in alkali, and methyl orange, which turns pink in acid. Other indicators change their fluorescence, *e.g.* acridine, which changes from green to violet at a certain level of acidity. Sometimes more accurate results can be obtained by using substances that precipitate out from solution at some precise stage in a chemical change. The chief substances used in this way are salts of heavy metals. *See also* Titration.

Indices. In mathematics, the symbols denoting the power to which a quantity has been raised. Thus $a \times a \times a$ is written a^3 , and 3 is the index or power to which

the quantity a has been raised. The notation was first used in 1637 by Descartes, but with positive integers only as indices. Thus for $x \times x$ he wrote x^2 , for $x \times x \times x$ he wrote x^3 , and so on. From this it is clear that

$$x^2 \times x^3 = x \times x \times x \times x \times x = x^{2+3} = x^5;$$

$$x^5 \div x^3 = x^{5-3} = x^2;$$

$$(x^3)^2 = x^{3 \times 2} = x^6; \text{ and}$$

$$\sqrt[2]{x^6} = x^{6 \div 2} = x^3.$$

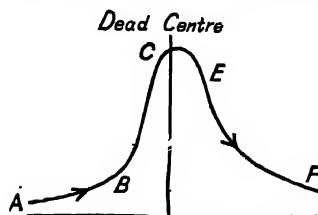
This establishes the rules for handling indices as follows: to multiply the numbers, add the indices; to divide the numbers, subtract the indices; to raise the numbers to a power multiply the indices; to extract a root, divide the indices.

In 1659 John Wallis extended the notation to cover the use of all rational numbers as indices. His method was to attach such a meaning to the expressions x^{-2} , $x^{\frac{1}{2}}$, etc., as would leave the rules for indices valid in all circumstances. Thus: $x^{-2} = x^{3-5} = x^3/x^5 = 1/x^2$; $x^{\frac{1}{2}} = x^{1+3} = \sqrt[2]{x}/x$; $x^{\frac{3}{2}} = \sqrt[2]{x^3}/x$; and, perhaps most surprising of all, $x^0 = x^{2-2} = x^2/x^2 = 1$.

It was Newton who further generalised the notation by using letters as indices in his original formulation of the binomial theorem. Today the expression x^a is uniquely defined for all values, real or complex, of a and x .

Indiction (Lat. *indicere*, to announce). Originally a proclamation or declaration. It was used by the Romans in this sense. In chronology it was used for a period or cycle of 15 years, and also for a year in the cycle. The indictions were first reckoned from Sept. 1, 312 B.C., but afterwards from the birth of Christ. This system, which is said to have been introduced by Constantine the Great, was widely used in the ecclesiastical chronology of the Middle Ages.

Indictment (late Lat. *indictare*, to point out). English law term for a written statement showing the crime of which a prisoner is charged. Formerly the accused could be tried by a petty jury only after a grand jury had considered the bill of indictment and the evidence for the prosecution and had decided that the evidence disclosed a *prima facie* case, in which event they endorsed the bill with the words "true bill." Grand juries were abolished in 1933 apart from a few exceptional cases; and today the bill of indictment is signed by the clerk of assize, or in quarter sessions by the clerk of the peace, and becomes an indictment upon which the accused is tried before a petty jury.



Indicator. Fig. 3. Diagram of pressure in an internal combustion engine. For key to lettering, see text

Formerly all indictments had to be written on parchment, and to specify with minute particularity the offence charged. The slightest flaw invalidated the indictment, and the prisoner went free. By the Indictments Act, 1915, it was enacted that indictments might be written on paper; and they were made less formal. All that is required is (1) a statement of the crime charged and (2) sufficient particulars to give notice to the prisoner of what he is really accused. Thus, an indictment for murder would now say, *Crime charged: Murder. Particulars: That John Jones did on the 1st day of July, 1948, murder Thomas Smith, at 222, High St., Harlaw, by striking him with an axe. The judge has extensive powers of amending indictments. See Trial.*

Indies. Name applied originally to certain regions of the East, India, Burma, Malay Archipelago, etc., which appears in such titles as the East Indies and West Indies. The extension of the term to the latter is due to the belief of early explorers that these islands formed part of the Asiatic group. *See* Indonesia; West Indies.

Indigirka. River of Asiatic Russia, in Yakutsk A.S.S.R. It rises in the Stanovoi mountains, and after flowing about 875 m. through a frozen desert, discharges itself into the Arctic Ocean near the settlement of Russkoye Ustye.

Indigo (*Indigofera tinctoria*). Sub-shrubby perennial of the family Leguminosae, native of the E. Indies.

The long leaves are divided into from four to seven pairs of oval leaflets. The red pea-like flowers are borne in sprays from the base of the leaves, and succeeded by long, narrow pods. The West Indian indigo (*I. anil*) is a larger plant with pinkish flowers.



Indigo, leaves and flowers

The blue colouring matter obtained from the plant has been used as a dye from the earliest times, although in Europe the native woad (*Isatis tinctoria*) was long preferred. The dye is obtained by steeping and macerating the leaves in water. Fermentation occurs and the insoluble blue dye is reduced to a colourless soluble compound—indoxyl. The solution

is transferred to another vat and aerated, the indoxyl is reoxidised to indigo, and this is precipitated as a blue mud which is dried. The natural indigo dye is now largely supplanted by coal-tar products and synthetic dyes.

Indigo Bird (*Cyanospiza cyanea*). Member of the finch family, fairly common in the eastern parts of the U.S.A. The male has bright blue plumage, while the hen is bluish grey. The bird is about 5 ins. long and is a pleasing songster.

Indirect Waves. Term used in radio communication to describe those waves transmitted to a receiving station which pass through the ionosphere (*q.v.*), or upper atmosphere. It is these indirect waves which render long distance radio communication possible, and also give rise to the phenomenon of fading.

Indium. A metallic element, which has the chemical symbol In and falls in the third group of the periodic table with gallium and aluminium, atomic number, 49; atomic weight, 114.76; melting point, 155° C., crystal form, face-centred tetragonal. The metal is silver-white, quite soft, extremely ductile, a little heavier than zinc. Although it has a relatively high boiling point it oxidises rapidly in air above its melting point and burns with a brilliant violet flame. Nitric acid dissolves it rapidly, hydrochloric and sulphuric acids only slowly.

Discovered by Reich and Richter from a spectral analysis of blende in 1863, indium recently became a metal of commercial importance. It occurs in the flue dust from zinc extraction plants, *e.g.* at Great Falls, Montana. Recovery of the metal is difficult, but it is obtained in its purest form by the electrolysis of a cyanide solution. When it is added to fusible alloys it gives them the lower melting points needed for surgical work. It is plated on to silver articles to enable them to take a high polish and to reduce tarnishing. By alternating indium and gold plating and then heating, a sky-blue colour is produced. Cadmium alloy and copper-lead bearings may be indium-plated to prevent corrosion by oils.

Individual (Lat. *in*, not; *dividere*, to divide). The indivisible, the being which forms by itself a complete whole. Logically, the individual is distinguished from others of the same species, which includes a plurality of individuals; metaphysically, from the absolute

substance which conditions and renders possible the existence of many individuals.

Individualism. Name given to a political and economic system that favours the development of the individual rather than that of the state or other association. It corresponds with an attitude of mind which places a high value on human personality. The antithesis of collectivism and socialism, like them it is variously defined, and appears in moderate and extreme forms. Individualism has found its strongest advocates and its main home among the English-speaking peoples, and its heyday was from about 1840 to 1880. It rested on the teaching of Adam Smith and Bentham, and was accepted with some modifications by J. S. Mill. An extreme exponent was Herbert Spencer. The creed of the average individualist is that the best results for mankind can be attained by giving free play to individual energy and initiative, applying this principle in the spheres of industry, morals, art, and speculation.

Since about 1880 there has been a strong reaction against individualism. In industrial practice competitive *laissez faire* had helped to produce conditions the reverse of satisfactory; science tended to emphasise the interdependence of the various forms of life; political philosophy, returning to Aristotle, dwelt upon the harmony that should exist between man and the state; and, most of all, practical life showed more and more how impotent was the individual standing alone. These factors tended to destroy individualism as a working creed, and since then legislation has been in the direction of collectivism of one kind or another.

The Soviet experiment in Russia gave an immense impetus to state planning, and this was reinforced by fascist and National Socialist ideologies in Europe, resting on the subordination of individual purposes to those of social, political, and cultural groups. During the Second Great War individual rights were everywhere invaded in the interests of total mobilisation of resources. Government controls (rationing, direction of labour, regulation of profits, censorship, nationalisation, etc.), have narrowed the field of private enterprise in all countries where Left parties are in power. In the U.S.A. individualism is still a force. *See* Collectivism; Socialism; Spencer, Herbert; State.

recognised on June 1 as another independent state of the proposed federation. Further negotiations in France and in Indo-China failed, however, Ho demanding the integration of all Indo-China into Vietnam; and fighting continued between the French and Ho's forces.

Treaties signed July 19 and Nov. 8, 1949, and ratified by France Feb. 3, 1950, recognized Laos and Cambodia as independent within the French Union. Complete independence was accorded to these kingdoms and to Vietnam in 1954, and Indo-China became simply a geographical term.

Indo-European. Name given to a people originally speaking a common language, the parent of what is now variously known as the Indo-European, Indo-Germanic, or Aryan family of languages. The name Indo-European, fairly representing the area over which these languages are spoken, is the most satisfactory. See Aryan; Ethnology; Philology.

Indole (C_8H_7N). White substance with a pearly lustre and disagreeable odour which was first prepared by heating oxindol, a product obtained from indigo, with zinc dust. It is, however, better made from dichloroether and aniline. The other name for indole is ketole. It occurs naturally in certain flower oils, and in the animal organism as a product of intestinal digestion. Indole is used in the preparation of neroli oils.

Indonesia. Geographical term for the E. Indian archipelago including Borneo and New Guinea

and sometimes the Philippines; since 1945 applied particularly to those parts of it constituting the former colonial empire called Netherlands (East) Indies. In this restricted sense Indonesia comprises Sumatra, Java, Madura, the Riau-Linggi archipelago, Banca, Billiton, Dutch Borneo, Celebes, the Moluccas, Dutch New Guinea, the Timor archipelago, Bali, and Lombok, all of which are described separately in this work. It has a total area of 735,267 sq. m., and a population estimated in 1957 as 83,500,000; this included a few Europeans, and some 1,500,000 Chinese and other Asians. (The census pop., 1930, was 60,727,233.) Some 60 languages are spoken, of which the most important are Javanese, Sundanese, and Madurese; but Malay is understood in most of the islands, and was the second official language with Dutch. Under Dutch rule all denominations enjoyed religious liberty. The bulk of the Indonesians are Mahomedans; Christians number some 2,500,000; Brahmins, in Bali and the W. of Lombok, 1,250,000; Buddhists, about 1,000,000; and there are heathen tribes in remote areas.

HISTORY. The first Europeans to explore Indonesia were Portuguese traders, who settled in some of the islands in the first half of the 16th century. English and Dutch expeditions arrived in the 1590s and ejected the Portuguese. The Dutch ousted the English, and in 1602 formed their East India company, which conquered the

islands one by one and ruled them until it was dissolved in 1798. During the French occupation of Holland, England seized the Dutch possessions in the E., restoring the Indies in 1816, from which date they came under the rule of the Netherlands government, represented by a governor-general.

With the opening of the 20th century the home government began a process of education in self-government, instituting first municipal councils and then, in 1918, a people's council (*volksraad*), in which Indonesian members gradually became preponderant. The revised Netherlands constitution of 1922 made the Netherlands Indies an integral and equal part of the kingdom of the Netherlands, and from 1927 the people's council shared legislative power in internal affairs with the governor-general. Of the council's 60 members—European, Indonesian, and foreign Asiatic—22 were appointed by the Netherlands government, 38 elected by the local councils; the chairman was appointed by the crown. The formation in 1927 of the National Indonesian party, which became in 1937 the Indonesian Nationalist movement, marked the rise of a strong independence movement.

SECOND GREAT WAR. Upon the capitulation of the Dutch army on May 14, 1940, the Netherlands government considered, but decided against, the possibility of establishing itself in the Indies, which remained, however, an important source of revenue to the government, of raw materials to the Allies as a whole. Japan's demands for economic concessions were refused; and after the bombing of Pearl Harbour by Japanese aircraft, Dec. 7, 1941, preparations were made, in conjunction with Australia, to resist a probable Japanese attack on the Indies. The rapid march of events left the main burden of defence in the hands of the Dutch authorities on the spot.



Indonesia. Map of the East Indian archipelago, part of which comprised the Netherlands (East) Indies

Their army, the bulk of it in Java, consisted of some 100,000 white and native troops. Their air force, small but efficient, comprised 200 bombers and 200 fighters. They had four cruisers, six destroyers, 18 submarines, and some motor torpedo-boats.

Japanese Conquest of the Indies

Japan massed a large fleet off French Indo-China, which was attacked repeatedly by the Dutch fleet. But the Japanese occupied Sarawak and Mindanao, thus gaining command of the Celebes Sea, by Dec. 20. On Jan. 10, 1942, two Japanese convoys sailed from Davao; one captured Tarakan off Borneo, the other Manado in Celebes.

A further convoy landed troops at Balikpapan in Dutch Borneo and at Kandari in Celebes. Yet another force occupied Amboyna.

On Feb. 14, 700 parachutists landed at Palembang in Sumatra; they were wiped out by the garrison, but the Japanese landed in force from the sea and rapidly secured the W. shores of the Sunda Strait. Bali was invaded Feb. 20. A week later an Allied squadron attacking a Japanese fleet heading for Java was virtually destroyed in a two-day running battle (*see* Java Sea, Battle of), and the Japanese landed 75,000 troops almost unmolested. Effective resistance ceased with the capture of Surabaya, Java, on March 8.

As Allied air power grew in the Pacific, Japanese bases in the Indies were heavily bombed. The Allied land and sea offensive reached Dutch territory with the landing of forces at Hollandia, New Guinea, April 22, 1944. The capture, June 20, of Biak Island, after more than three weeks' desperate resistance, gave the Allies control of New Guinea, though large pockets of Japanese still remained there. Morotai in the Moluccas was secured Sept. 14, and then the main Allied offensive swept N. to the Philippines. In 1945 Australian forces attacked Borneo: they recaptured Tarakan May 1-June 24, and landed on Balikpapan on July 1. Operations were continuing in Borneo when Japan surrendered, Aug. 14. At the moment Japanese resistance ceased—much more suddenly than had been anticipated—the area covered by South East Asia Command (*q.v.*) was actually being extended, Java coming under it on Aug. 15, 1945. S.E.A.C. had at its disposal too few troops for immediate and adequate occupation of all areas under its authority;

and not until Sept. 28 did a token force of less than 2,500 British soldiers land in Java. The mission of this force, later increased to 96,000, was to rescue Allied prisoners and internees (c. 100,000), round up the Japanese, and take over the administration. But it found a "provisional Indonesian republican govt.", under Achmed Sukarno, in control of large areas; and in carrying out their mission S.E.A.C. troops had at times to counter armed opposition from Indonesians using weapons and ammunition transferred to them, against the surrender terms, by the Japanese. As Dutch troops became available, Anglo-Indian forces were withdrawn, the last leaving Indonesia Nov. 30, 1946.

Dutch-Indonesian Negotiations

The Netherlands govt. had already in 1942 announced its intention to reconstruct the kingdom after the war as a commonwealth in which each of its four parts (the homeland, the E. Indies, Surinam, and Curaçao) would handle its own internal affairs; but the "provisional Indonesian govt." refused to recognize Dutch sovereignty. The Dutch, on their side, objected to negotiating with what they regarded as a Japanese puppet administration. British mediation brought Dutch and Indonesians to negotiations which continued, with sporadic outbreaks of armed hostilities, until the signing of the Linggadjati agreement, Nov. 15, 1946, approved by the states general at The Hague, Dec. 20. This recognized the govt. of the republic of Indonesia as exercising *de facto* authority over Java, Madura, and Sumatra; and stipulated the formation of a federal United States of Indonesia. Differences over interpretation, and renewed fighting, followed. In July, 1947, India and Australia brought the position before the U. N. security council, which called on both sides to cease hostilities.

Parts of the area claimed by the republic broke away from it during 1948, and were recognized by the Netherlands as autonomous states. Resumed negotiations with the republic coming to nothing, the Dutch issued a decree on Dec. 19 providing for the formation of an interim federal govt. of Indonesia outside the republic; and on the same day re-opened military operations with the object of bringing the republic within the federation. The republican leaders were arrested.

On Jan. 28, 1949, the U. N. security council called on the

Netherlands govt. to release all political prisoners, and to establish a "federal, independent, and sovereign" United States of Indonesia by July 1, 1950. On Feb. 27, 1949, the leaders were released, and after further negotiations in Batavia, under U. N. chairmanship, a conference of Dutch, republican and non-republican Indonesian, and U. N. representatives, sitting Aug. 23-Nov. 2 at The Hague, reached agreement. The kingdom of the Netherlands undertook to transfer sovereignty to the republic of the United States of Indonesia, consisting of the *negaras* (autonomous states) of: the republic of Indonesia; E. Indonesia (Celebes, Bali, the Moluccas, Timor, Flores, Sumba, and some smaller islands); W. Java; E. Java; Madura; E. Sumatra; S. Sumatra; the *daerahs* (constitutional units) of: Central Java; Banka; Billiton; the Riau archipelago; W. Borneo (Kalimantan Barat); Great Dyak; Bandjar; S. E. Borneo (Kalimantan Tenggara); E. Borneo (Kalimantan Timur). W. New Guinea remained Dutch (*see under* New Guinea).

The statute of the Netherlands-Indonesian union, signed at the same time, created organized co-operation between the two countries. These agreements were ratified by the Indonesian states, and by the Dutch states general; and formal transfer of sovereignty took place Dec. 27, 1949. Batavia, under the name Jakarta, was constituted the capital of the U.S.I. The republic of Indonesia, though disturbed by internal dissension, was by far the strongest of the states in the U.S.I., and began immediately to absorb the others, until on Aug. 15, 1950, the whole area was proclaimed the republic of Indonesia. Relations between the Netherlands and Indonesia continued to be uneasy. The republic maintained itself despite risings in Celebes, the Moluccas, Sumatra, Java, and Borneo; and in 1956 unilaterally abrogated the union with the Netherlands.

Indonesian. In ethnology, a term denoting an ethnic stock in S.E. Asia and adjacent archipelagoes having affinities with other peoples of the Asiatic mainland. The Indonesian peoples are short, long- or medium-headed, wavy-haired, olive to brownish-yellow. They include the Indian Ocean Nicobarese and Salons, the Assam Nagas, the Indo-China Khas and Moïs, the non-Malay Borneans, the Philippine Tagals and Igorots,

and Sumatra Battas, almost all showing ethnic admixture. In philology the term denotes a subfamily of the Austronesian division of the Austric family. Neither people nor language coincides with the Indonesian geographical region.

Indore. Division of Madhya Union, India, formerly a princely state which adhered to India in 1948 as part of Madhya Bharat (absorbed in Madhya Union 1956). Only about a fifth of the division is under cultivation, grain and cotton being the chief crops. Cotton and artificial silk textiles, pipes, and confectionery are made. Area 9,934 sq. m. Pop. (1951) 596,622.

Indore city, capital of the division as it was of the state, is an important commercial town. It contains several colleges (two of them medical), trades in grain, tobacco, and opium, and lies on the Malwa Plateau N. of the Vindhya Mts. The former maharaja's palace is a fine building. Pop. (1951) 310,859.

Indra. Deity in ancient Hindu belief, representing the air or the heavens. At one time regarded as the chief of the gods, he has fallen into comparative unimportance. He is represented as a four-armed figure seated on an elephant, sometimes riding in a car. See Hinduism.

Indre. River of France. It rises on the slopes of the Auvergne plateau, and, flowing N.W., joins the Loire 18 m. W.S.W. of Tours. Its length is about 115 m., and it is navigable from Loches to the Loire, a distance of 45 m.

Indre. Dept. of France. In the centre of the country, it is mainly a plateau and an agricultural area watered by the Indre and the Creuse. Physically it is divided into three parts: the Boischaut, covering much of the dept.; the Champagne, a fertile region in the N.; and the Brenne, a marshy district in the W. Wheat, vines, and beet are grown, and sheep are reared. Indre is noted for chestnuts, and for lithographic stone. Châteauroux is the capital. Area 2,664 sq. m. Pop. (1954) 247,436.

Indre-et-Loire. A dept. of France, in the centre of the country. Its area is 2,377 sq. m. It is in an area watered by the Loire, Indre, Cher, and Vienne, being divided into two parts by the Loire. The dept. is part of the central plain and contains the districts known as the Gâtine, the Véron, the Champeigne, and the Brenne. Although there is an infertile region in the N., most of the dept. is productive, especially along the valley of the Loire, and the vine is extensively grown.

Corn and fruit are other products. The chief town is Tours; others are Chinon, Amboise, and Loches. The dept. formed most of Touraine prov. Pop. (1954) 364,706.

Inductance. A property of electric circuits. A varying magnetic field in one circuit induces e.m.f.s. in all neighbouring circuits (by mutual induction) and also in its own circuit (by self-induction). The effect of self-inductance is like inertia of the circuit: when the e.m.f. is switched on in a circuit with considerable self-inductance, the current builds up slowly to its final steady value, and it dies out correspondingly slowly when the e.m.f. is switched off. Thus it affects electrical oscillations just as mass affects mechanical oscillations. The coefficient of self-inductance L measures this effect of a circuit on itself. The unit is the henry ($q.v.$). When the variation of the current is dI/dt amp per sec., the induced e.m.f. (in volts) is $V = L(dI/dt)$. The coefficient of mutual inductance M (in henries) is given by $V = M(dI/dt)$ where V is the voltage induced in a neighbouring circuit. The term inductance is also applied to coils wound specially for their inductive effect (more properly called inductors). They are used extensively in radio and electronic apparatus. Cores of magnetisable material increase their effect by increasing the magnetic fields produced.

Inductance. Electrostatic inductance or influence (formerly induction) is the separation of positive and negative charges on conductors near a charged body. If, for instance, a positively charged, insulated metal sphere is brought near one end of an insulated metal rod, a negative charge will appear at the end of the rod nearest to the sphere, and an equal positive charge at the far end; vice versa for a negatively charged sphere. The closer the bodies approach, the more marked the effect. This principle underlies the action of such electrical apparatus as the electrophorus, the (gold leaf) electroscope, and the Wimshurst machine ($qq.v.$).

Electromagnetic induction is usually applied to the production of electromotive forces (and hence frequently of currents) in conductors by their motion relative to a magnetic field. The relative motion may be produced by physical movement of the conductors, magnets, etc., or by variation of current strengths. The faster the conductor cuts

through the magnetic field the greater is the induced voltage. The matter was investigated primarily by Faraday (his "anchor ring" experiment was one of many) but also by Lenz, Henry, Neumann, Kelvin, and others. Lenz's Law states that the induced e.m.f.s will be in the direction which tends to oppose (by means of the induced currents) the variation of current which gave rise to them. Faraday's (or Neumann's) Law states that the voltage induced in a circuit equals the rate of change of magnetic flux through the circuit. On electromagnetic induction depends the generation of electricity by dynamos (see Electromagnetic Machine).

Magnetic induction is the name sometimes used to denote one of the two vectors describing a magnetic field where a magnetic material is present. Usually (but not always) it is applied to the vector denoted by B .

Induction. Term in eccles. law for the ceremonial placing by the archdeacon of a clerk in holy orders in actual possession of a church or glebe; investiture of the temporal part of a benefice, as institution ($q.v.$) is of the spiritual. Induction consists in giving the clerk corporal possession of the church, as by holding the handle of the door or tolling the bell, the intention being to give all the parishioners due notice and sufficient certainty of their new minister to whom their tithes are to be paid. Not until a clerk has been formally presented, instituted, and inducted into a rectory is he in full and complete possession of the benefice and legally styled *persona impersonata* or parson imparsonee.

Induction (Lat. *inductio*, bringing in). Mental operation by which it is inferred that what is known to be true in certain cases at certain times will be true in all cases at all times. This method of reasoning is based upon the principle of causality—that similar causes or conditions are always followed by similar effects. See Deduction; Logic.

Induction Coil. Electrical apparatus comprising two coils in which rapid variations of current in the primary circuit induce large e.m.f.s in the secondary. In the Ruhmkorff coil the primary, of fairly thick wire, is wound on an iron core, and outside this is wound the secondary, of many turns of fine wire carefully insulated. It uses direct current, and the rapid variations in the primary are produced mechanically by a

"buzzer," which works on the same principle as the electric bell (*see* Bells). A condenser is included across the contact points, the effect of which is to make the primary current decrease more rapidly than it builds up, and so produce a greater secondary voltage in one direction than the other.

Efficiency of the induction coil is improved by using stampings or parallel iron wires bound closely together instead of a solid iron core. When high voltages are required (say 50,000 volts or more), other types of interrupter must be used, *e.g.* the mercury jet. This comprises a motor-driven vertical hollow spindle with a hole in one side, and since it dips into mercury, the latter will be sucked up and projected through the hole by centrifugal force. The mercury jet impinges on a serrated metal ring which will serve to intercept and pass the jet continuously, so that several thousands of interruptions per second may be obtained. *See* Transformer.

Indulgence (Lat. *indulgere*, to grant, make a concession). As officially defined by the R.C. Church, a remission, granted by the Church, of the temporal punishment which often remains due to sin after its guilt has been forgiven. In the early days of the Church penitents were awarded severe public penances for their sins, especially apostasy, during the age of persecution. As a reward for the constancy shown by the faithful awaiting death in prison, the bishops, on the petition of these, sometimes granted remission of part of the penance to weaker brethren who were truly contrite. In time the indulgence was extended to the temporal punishment being suffered by souls in purgatory, and in the 14th century Pope Clement VI authorised the doctrine of the "treasury of merits," whereby the over-abundant merit of Christ and of the saints was deemed to have accumulated into a fund upon which the pope could draw for the relief of souls enduring punishment in this world or in purgatory.

Indulgences were either plenary, granted to persons absolved from all sin, or partial, granted to those who had the burden of no mortal sin upon their soul. Forgiveness of the sin was a necessary antecedent to the granting of either, which further was conditional upon the performance of acts of charity or the recital of prayers. But, however unexceptionable in its initial conception the system of indulgence may have been, it was

obviously liable sooner or later to misinterpretation and abuse.

The methods resorted to by Archbishop Albert of Mainz and Magdeburg, commissioner for Germany for the sale of indulgences authorised by Pope Leo X when rebuilding the church of S. Peter in Rome, and by the archbishop's sub-commissioner John Tetzel, amounted to a scandal which provoked from Martin Luther the 95 theses which he nailed to the door of the castle church of Wittenberg on the Eve of All Saints, 1517, and thereby launched the Reformation. The pope still grants indulgences, partial and plenary. *See* Reformation.

Indulgence, DECLARATION OF. Declaration of religious liberty issued by Charles II and James II. To afford relief to his R.C. subjects, James II, in April, 1687, issued without consent of parliament a declaration of indulgence, and a year later a second. These gave all his subjects complete religious liberty, thus setting aside the Test Act and the other measures passed after the Restoration which oppressed both Roman Catholics and Dissenters.

The declarations were never put into force, but by ordering all clergymen to read the second in their churches on two successive Sundays, James brought about the protest of the Seven Bishops, who were tried for publishing a seditious libel, but acquitted. In 1672 Charles II had issued a similar declaration of indulgence, but in 1673 at the desire of parliament he cancelled it. Both kings claimed a right to make the declaration by virtue of their prerogative, but almost unanimously the nation repudiated the claim as dangerous. *See* Prerogative.

Indulines. A group of blue, violet, and black aniline dyes. The first dyes of the series was made by Dale in 1863 by heating aniline hydrochloride with a solution of sodium nitrate. This colour was called azodiphenyl blue or induline, but similar dyes are also known as Coupler's blue, nigrosine, and violaniline. Induline is soluble in spirit and is used in calico printing and for the preparation of black spirit varnishes. *See* Dyes.

Indus OR THE INDIAN. Faint constellation of insignificant stars in the S. hemisphere, named by Bayer. It is near Sagittarius.

Indus (Sanskrit, *Sindhu*). River of Asia. It rises near the sources of three other great rivers—the Sutlej, Brahmaputra, and Ganges, on the N. slope of Mt. Kailas in

the Tibetan Himalayas, at an alt. of about 18,000 ft. Flowing N.W. through Ladakh, it bends S. about 20 m. S.E. of Gilgit, and then proceeds tortuously but generally in a S.W. direction to its delta in the Arabian sea. Its length is 1,800 m.; and drainage area 372,700 sq. m. It receives the Gartang 160 m. from its source and at Leh it is crossed by the trade route from India into Central Asia, via the Karakoram pass. Fed by the melting snows, it first flows impetuously through abysmal defiles in the Himalayas, then it emerges from the mountains and receives the Kabul river near Attock. Here, although at this point it has fallen some 16,000 ft., it is still a turbulent torrent. Near Mithānkot it receives the Punjnad, which carries the accumulated waters of the five rivers of the Punjab, *viz.* the Sutlej, Beas, Ravi, Chenab, Jhelum.

The delta embraces 125 m. of coast, and covers about 3,000 sq. m. In its numerous arms the sandbanks are continually shifting, causing the channels to change their course, and the present chief estuary was only a minor channel in 1845. The tide is perceptible at 75 m. from its mouth. Hyderabad is the chief city on the banks, and the river is navigable to the neighbourhood of Attock, a distance of 900 m. Karachi, capital of Pakistan, stands at the extreme W. of the Indus delta. Fish are abundant, and otters, turtles, and the long-snouted alligator (*gavial*) are also found.

The Indus basin is notable for its scanty rainfall and high summer temperatures. During the monsoon, winds from the S.E. creep along the Himalayan slopes and bring a comparatively small rainfall to the Indus and its tributaries where they emerge from the foothills; S. and W. of this zone the rainfall rapidly decreases. The basin has four zones: the mountain section of glaciers and ravines where the rivers are torrential; the foothills section where the rains fall in the monsoon season; the upper plains with a slight monsoon followed by a dry season until the cold, rainy season from Jan. to March and the hot season from May to July; and the lower plains where the river flows across the edge of the Thar desert, a rainless region of great heat. Throughout the lowland parts of the basin the rainfall is inadequate or uncertain. The Lloyd barrage at Sukkur and a system of canals there—three on the right bank, four on the left—constitute the largest

irrigation scheme carried out by the British in India. Irrigation from these canals began in 1932. Canals have also been made to tap the torrential waters of the eastern tributaries and irrigate the upper plains, and to take off water from the lower river for the benefit of Sind (Pakistan). Most of the basin of the Indus lies in Pakistan, but the river also waters Kashmir.

INDUS VALLEY CIVILIZATION. This, sometimes called the Harappā culture, is the civilization of the city-dwelling people of prehistoric India before the Aryan invasions. Remains of their cities have been found in more than 40 sites, the largest and best explored being Mohenjo-Daro and Harappā; all are in or around the valley of the r. Indus, in Sind and the Punjab. Over a wide area, from the Makran coast to Rajputana, the remains of this flourishing civilization are remarkably uniform, and the identical nature of the pottery, glyptic art, building methods, and town planning, and the standard system of weights and measures in use throughout the area, argues a united kingdom organized under a central authority, possibly a priest-king.

The cities that have been excavated are planned on a grid, with wide intersecting streets; from the houses rainwater and sewage ran through culverts into a central covered drain. Houses were spacious and solidly built of mud-brick, generally round a courtyard with a well, and were equipped with staircases, bathrooms, rubbish chutes, and a drainage system. Many were of considerable size and presumably belonged to a wealthy merchant class; others were two-roomed "workers' cottages" built in rows. Public buildings included a great bath at Mohenjo-Daro, perhaps used for cult purposes, and a huge granary at Harappā. The king's (or governor's) palace, and perhaps also the temple or other cult building, may have been on the heavily fortified citadel which rises above either site, on a massive brick platform.

Up to mid-1957 no large sculptures, reliefs, or murals had been found, and no monumental inscriptions; but finds included numerous stamp seals bearing short inscriptions in a linear pictorial script which, in the absence of any bilingual, had defied decipherment. Nothing is known of the identity or history of the nameless builders of these cities, and little can be guessed of

their religious beliefs: the seals depict animals, e.g. the buffalo, humped zebu, rhinoceros, elephant, tiger, and gharial, in front of a sacred emblem of some sort; and one or two figurines and a male figure cross-legged on a seal which may represent deities. Some features are thought to point to continuity between the religious beliefs of these people and those of the later Hindus.

However that may be, the civilization of the ancient Indus Valley seems to be purely Indian in character, though it had contacts by trade (probably by sea) with ancient Sumer and perhaps also with Egypt.

This civilization is believed to have flourished from about 2500 B.C. to 1600 B.C. or a little earlier, and showed remarkably little change throughout this long period. It may have evolved from the village communities of Baluchistan with their painted pottery; it ended with the arrival of a new people from the north-west, perhaps forerunners of the invading Aryans, who sacked the great cities and overran the empire. Consult Mohenjo-Daro and the Indus Culture, Sir John Marshall, 3 vols., 1931; The Indus Civilization, E. Mackay, 1935; Prehistoric India, S. Pigott, 1950.

Industrial Council. See Joint Industrial Council.

Industrial Court, THE. Board for settling trade disputes. In the United Kingdom these were established by the Industrial Courts Act, 1919. This provided that imminent disputes reported to the ministry of Labour should be referred for settlement to a standing industrial court consisting of representatives of employers and employed, together with some independent person. A permanent court was set up; its headquarters is at 1, Abbey Garden, Great College Street, Westminster, S.W.1.

Industrial Design, THE COUNCIL OF. British body set up in 1944 by the president of the Board of Trade, to promote the improvement of design in the products of British industry. There is a separate Scottish committee. The council is financed by and responsible to the government. Among its operations are the establishment of design centres in industries, supported on a cooperative basis with the help of a government grant; their functions include research, organization of exhibitions, and liaison with educational authorities. The word design is held to cover structure, texture, form, and

decoration. The exhibition in London in 1946, entitled Britain Can Make It, was held by the council, which has a showroom and offices at 28, Haymarket, London, S.W.1.

Industrial Diseases. In general, diseases which arise from and in the course of industrial processes. The term is applied to diseases specified under the National Insurance (Industrial Injuries) Act, 1946 (or, earlier, under the Workmen's Compensation Acts). A person employed in certain industrial processes becomes entitled to benefit if incapacitated by specified diseases due to the nature of his employment just as he would be if he were incapacitated by an accident at work.

The minister of National Insurance may prescribe a disease as an industrial disease if he is satisfied that (1) it ought to be treated as a risk of the occupation and not as a risk common to all persons, and (2) the attribution of particular cases to the nature of the employment can be established or reasonably presumed. Obvious examples of industrial diseases are anthrax arising from the handling of wool, hair, bristles, hides and skins; dope poisoning arising from processes in the manufacture of aircraft; and dermatitis produced by dust or liquids.

Under the provisions of the Factories Act, 1937, every medical practitioner attending on or called in to visit a patient whom he believes to be suffering from lead, phosphorus, arsenical, or mercurial poisoning, or anthrax contracted in any factory, must notify the same to the chief inspector of factories. See also Workmen's Compensation.

Industrial Organizations, CONGRESS OF. See Congress of Industrial Organizations.

Industrial Psychology, NATIONAL INSTITUTE OF. Organization of psychologists specially trained to apply their science to increasing the efficiency of industrial and business concerns. The institute, founded in 1921, advises firms as to factory lay-out and systems of reducing waste of energy by operatives engaged in routine processes. It prepares intelligence and aptitude tests for the recruiting and training of employees for factories, offices, and shops. The offices are at 14, Welbeck Street, London, W.1.

Industrial Research, DEPARTMENT OF SCIENTIFIC AND. See Scientific and Industrial Research, Department of.

THE INDUSTRIAL ENGLAND

Further information will be found in the general article, United Kingdom, while Apprenticeship, Enclosures, and Guild are cognate subjects. See Smith, Adam; Wealth of Nations; and biographies of Hargreaves; Watt; Stephenson, and other inventors

The Industrial Revolution is the term used for the process which changed England from an agricultural to a manufacturing country. It belongs to the latter half of the 18th and the beginning of the 19th century. There had been a few notable inventions in the days of George II; but in the long reign of his successor, industry was so completely altered in character, and the daily life of the great masses of people so fundamentally changed, that the word "revolution," popularised by Arnold Toynbee in his study of the period, is now generally accepted.

About 1800 the hand spinning wheel, the hand loom, and the plough remained almost unchanged from very early days; but now the old machines were unequal to the demands made upon them. Everywhere in England was felt the spur to invention, the desire for better means of communication by land and water, the need for increased capital. The middleman had for some time had his settled place in English industry, supplying the raw material to the handicraftsman, and finding a wider market for the finished goods. At the same time the older economy had been giving way to the newer views of freedom in industry and commerce even before the publication of *The Wealth of Nations* in 1776.

Early Mechanical Inventions

The first great series of mechanical inventions began when Kay patented the flying shuttle in 1733. Hitherto the weft was passed through the warp by the weaver. It was now thrown across a much wider space by a mechanical device which greatly increased the weaver's power of work. It was in the cotton industry that the next improvements were made, the need being for an adequate supply of yarn.

In 1764 Hargreaves invented the spinning jenny, a hand power machine which could be worked easily by a child. In 1769 a new principle was introduced by Arkwright, who spun a finer and a stronger thread by using a system of rollers, revolving at different velocities and worked by water power. By the water frame pure cotton goods could at last be made with a strong cotton warp.

In 1779 Samuel Crompton combined the principles of both inventions in the mule, a hybrid machine which produced a still stronger

REVOLUTION IN G. H. Leonard, M.A., formerly Prof. of Modern History, Bristol

and finer cotton yarn—a muslin wheel, as it was sometimes called—that started a flourishing industry in which large fortunes were made. Though the hand spinners broke the frames, being afraid, and not without reason, that the new labour-saving machines would throw them out of employment, before Hargreaves died, in 1778, 80,000 jennies were being used in various parts of the country.

In 1785 Cartwright invented the first practical mechanical loom, and began the revolution in weaving. This was followed by his machine for wool-combing in 1789. It was not, however, till 1815 that the loom was perfected and came into general use. Improvements were now constantly being made in all the textile industries, and gradually the hand weaver disappeared as the hand spinner had done before him, unable to compete with the new machines.

The Supply of Power

But these new machines, practically all of English origin, called for a new power. Horse power was not unknown, but the hand or the foot of the worker was still the chief motive power. It was the use, first of water and then of steam, that made the revolution complete. Little sheds for the machines began to be built by waterfalls and rivers. The supply of water, however, was uncertain, and the ponderous steam-pump, which had long been used in the mines, was at last developed in 1766 into a practical engine to drive the machines of the spinners and weavers. James Watt saw how the up-and-down stroke of the piston could be best applied to the rotary motion of the wheel and axle. His steam engine was first used in the cotton mills, and soon in all the textile industries.

The development of England's vast mineral resources, checked in the 17th century by the lack of steam power, now proceeded apace. Abraham Darby had already discovered that iron could be smelted with coke, and the new era was ushered in by the use of Smeaton's blast furnace in the Carron Iron Works, 1760. This method was soon improved by the use of steam, and by Cort's invention, in S. Wales, of puddling, in 1783, and his use of rollers instead of sledge hammers in the making of iron bars in 1784. John Wilkinson, the first of the new ironmasters, was thought iron-

mad because he believed that iron could be used for building bridges, ships, and houses. An iron bridge, cast by Darby, was thrown over the Severn at Coalbrookdale in 1779, and Wilkinson launched an iron ship on the same river in 1790. There seemed no end to the uses to which iron and steel, first cast by Huntsman at Sheffield, could be put. Before the industrial revolution England hardly exported any iron; in 1815 it sent abroad more than 90,000 tons.

Shifting and Growing Population

It was natural that the new vast ironworks should be established in the coal districts. Everywhere industries were shifting to be near the sources of power, leaving the old half-agricultural centres of industry for Lancashire and Yorkshire, the Midlands and the north. At the same time the steady drift into the towns from all the countryside, noted almost from the days when town life first began, was now proceeding on so large a scale that soon the majority of men were leading an urban rather than a rural life. This was in itself a revolution.

But population was not only shifting; it was increasing by leaps and bounds. Since the cheapening of production created an ever-growing demand at home and in the new markets abroad, in the long run the demand for labour for men—and also for women and children, who could easily manage the light work of the new machines—increased so fast that all the old prudential checks to population, where they existed, were swept away. Wages might be low, but in large families there were many wage-earners to eke out the family income. In 1750 there were perhaps six million people in England and Wales, but in the second half of the century the population seems to have increased about 50 p.c. The first census was taken in 1801. In 1811 an increase of 14 p.c. of the population was shown, and of 21 p.c. in the next ten years.

The Country's Food Supply

The problem of feeding so large a population was a serious one, and before the end of the century it was becoming clear that the main supply would have to be imported from the new food-producing countries of the world. Side by side with the industrial changes another revolution had been taking place in agriculture. In 1760 about half the parishes in England were still in open fields. A new husbandry was soon to change the face of rural England. With the new grasses and winter feed roots a scientific rotation of crops was

at last possible, and the experiments of "Turnip Townshend," Coke of Norfolk, and Bakewell were copied all over the country. Lands were marled, manured, and drained. New implements and machines lessened the labour of man and beast. Arthur Young's constant testimony that "without enclosure there can be no good husbandry" led to innumerable private enclosure Acts before the general Act of 1801. Farmers could now do as they pleased with their land, and capitalists who invested in land made enormous profits. But the smaller cultivators, without ready money, were unable to compete with the great landowners, and the labourers especially suffered by loss of common rights.

The small farmers, who had been the backbone of England, gave up the struggle as hopeless, sold their farms, and found their way into the towns to try their fortunes, or sank into the position of agricultural labourers. Production was increased, and wealth accumulated in the hands of the few, but the "decay of men" of the lower class was a serious loss to the nation. Gangs of labourers worked the great estates, depending now almost wholly on wages.

Results of the Revolution

Early in the 19th century the industrial revolution was virtually complete. The economic structure of England was altered. Steam and machines had already driven out the old hand work in all the principal industries of the country. It was no longer scattered over the country nor carried on, for the most part, in the homes of the people. Masses of men, for the first time divorced from the soil, were crowded together in mean, monotonous streets, often without a yard of garden or allotments for their leisure time, or any of the old by-products of the home.

The great majority in town and country had become wholly dependent on wages earned in the service of others. More and more they tended to become mere "hands" in the gaunt, ill-built, ill-ventilated, insanitary, uninspected factories, to wait on the machines which seemed never at rest night and day. Industry was directed by the factory owner who could afford the initial expense of buying and housing the machines, or could borrow perhaps from one of the new country banks. Custom based on reasonable ideas of welfare, which had once regulated all industries, gave way altogether to competition.

Government interference came to an end. Labour conditions were in a state of chaos, and no new legislation seemed possible as long as the theories of the ever-hardening science of political economy were accepted by men and masters alike.

Increased Wealth for the Country

The economic advantages of the change were many. Through the factory system came greater regularity of work, better organization, and far less waste of human effort. There was a great increase in speed and output. Trade, in which England kept the lead given her by her inventions, the command of the sea, and her supply of raw material, coal and iron at home and cotton from abroad, brought immense wealth into the country. Her teeming population enabled her to people the greater Britain which was being built up over the seas, and even the herding of men in great towns, in so far as it enabled them to cooperate for improving economic conditions, and for political action, was certainly not without its good side.

The many and obvious inequalities of the old political system could not, however, be hidden from men who realized that the new towns teeming with life and energy were unrepresented, while a "rotten borough" with few or no inhabitants might send two members to parliament. The Reform Bill of 1832, though it left working men still unenfranchised, was "a direct result of the changes of the time," and had far-reaching effects.

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Industrial School. Former name for state-aided or state-maintained institution for training children, principally those with criminal or other undesirable associations, now commonly known as approved schools. The idea originated in the work of John Pounds (1776-1839) for neglected and vagrant children, and that of the Ragged School Union. The industrial school expressed the newer conception that the law should seek rather to prevent and cure a tendency to wrongdoing than merely to punish the offender.

The Children's Act, 1908, drew a distinction between reformatories for actual offenders and industrial schools for the potential offender and very young children. The two types of institution were merged and renamed approved schools under the Children and Young Persons Act, 1933. See also Borstal System.

Industrial Workers of the World. International labour association, formed at Chicago in 1905. Regarding orthodox trade unionism as a failure, it held that the expropriation of employers, and the seizure of all instruments of production by workers, could best be effected by the organization of labour in one great union practising "direct action." Under William Haywood (1869-1928), the association made progress in the U.S.A. among unskilled labourers, chiefly immigrants, and gained an unenviable reputation for violence, e.g. use of bombs. During the First Great War the leaders were suspected of accepting German money to foment industrial unrest, and Haywood was arrested. It ceased to be effective after the Communist movement (with which it disagreed) began to grow in the early 1920s. Members of the I.W.W. (as it was usually called) were colloquially referred to as "wobblies."

The organization spread to Australia and New Zealand in 1909, and caused labour troubles in the 1920s, although outlawed by the Australian government in 1917. British branches were established quite early, but the members, chiefly drawn from the dock areas of London, Liverpool, and Glasgow, were not numerous.

Indy, (PAUL MARIE THEODORE) VINCENT D' (1851-1931). French composer. Born in Paris, March 27, 1851, he studied at the conservatoire under Franck and became a pianist. An overture, *Piccolomini*, was written while he was a student; a rewritten version became the basis of an orchestral trilogy, *Wallenstein*, performed at Queen's Hall in 1909. He composed several symphonies, e.g. that on a French mountaineer's song for piano and orchestra; his most famous work was probably the music drama, *La Légende de S. Christophe*, 1920. D'Indy was director of the *Schola Cantorum* in Paris (founded 1894). He edited *Chansons Populaires du Vivarais*, 1900, and his biography of Franck, 1906, is a standard work. He died Dec. 3, 1931. *Pron.* (approx.) daandee.

Ine OR **INI** (d. c. 730). King of Wessex. He became king in 688 and reigned until his abdication in 726. The chronicle tells of his wars against the Britons and the adjoining kingdoms of Kent, Sussex, and Mercia; in general these were successful, Kent, Essex, and London being brought under his rule. Civil strife drove him into retirement to Rome, where he probably died. Ine issued a code of laws which is still extant.

Inert Gases. The elements helium, neon, argon, krypton, xenon, and radon of Group 0 in the periodic table (*see under Chemistry*). They have a valency of 0, do not combine with any other element, and are sometimes called the "rare" gases or the "noble" gases. They are fission products from the radioactive disintegration of heavy elements. All occur in the atmosphere, which is the main commercial source of all except helium and radon. Helium, the most plentiful, is present to the extent of 4-6 parts per million.

Helium was first observed in the sun's atmosphere in 1868 by P. Janssen, a Frenchman, and by J. N. Lockyer, an Englishman, acting independently. In 1891 W. F. Hillebrand in the U.S.A. found helium, without recognising it, in gases derived from heating uraninite. During 1894-98 (Sir) William Ramsay and co-workers not only duplicated this work, and identified helium and argon in gases derived from uranium minerals, but also isolated all except radon from the atmosphere.

In 1905 H. P. Cady and D. F. McFarland found nearly 2 p.c. of helium in natural gas from Dexter, Kansas, and later it was found that other natural gases widely distributed over North America contained helium in quantities varying between 1 p.c. and 8 p.c. Under the stimulus of the U.S. military and naval authorities, plant was developed for the large scale recovery of helium from this source, and in 1920 the U.S. navy's C-7 was the first airship to make a flight filled with helium.

Large scale production of argon started in 1920 to provide supplies for filling incandescent electric light bulbs, for which purpose it is superior to nitrogen; later it was found to be the most suitable filler for fluorescent lighting tubes. Mixed with other gases of the same group, it forms the filler of "neon" light signs, the colours developed depending on the proportions present. Neon produces red to orange shades, argon deep blue, helium

pale pink to white, krypton pale blue.

Both helium and argon are used as shields in the welding of light metals, which can be carried out successfully only in an inert atmosphere. The low refractive index of helium makes it valuable as a filler for the spaces between compound lenses in optical systems. Helium also has medical applications. It is substituted for nitrogen as a diluent for oxygen in breathing apparatus, both for the treatment of severe asthma and related conditions, where its low gravity enables the mixture to penetrate restricted passages more readily than air, and for divers and others operating under high pressures, since its low solubility in blood and body tissues obviates the risk of bubble formation in the venous system when the operator returns to normal pressure conditions.

Xenon is often substituted for mercury in vapour lamps. Its electrical properties are almost identical with those of mercury vapour, and it has the advantage of not condensing at atmospheric temperatures.

Radon, a radioactive gas, is produced from radium, and used in the treatment of cancer.

Inebriate (Lat. *in, in*; *ebriare*, to make drunk). Legal term for an habitual drunkard. These are persons who by reason of habitual intemperate drinking of intoxicating liquors become at times dangerous to themselves, or incapable of managing their affairs, or a cause of harm or annoyance to others. Provision is made for them by the Habitual Drunkards Act, 1879, and the Inebriates Act, 1898. An habitual drunkard may voluntarily apply to enter a retreat licensed by the local authority. He may not leave until the expiry of the term in his application except on the order of a justice. If convicted of a serious offence caused by drunkenness he may be ordered to be detained, for not more than three years, in a state inebriate reformatory, or in a certified inebriate reformatory maintained by a local authority or privately. Convicted four times in a year of certain minor offences, he may be detained for not more than three years in a certified inebriate reformatory. His name must be placed on a black list, and if within three years he attempts to buy intoxicating liquor, he and any person knowingly supplying him may be fined.

Inertia (Lat., idleness). In mechanics, the tendency of a body

to keep the motion it may have. It is more closely defined by Newton's first law of motion, that every body continues in its state of rest or of uniform motion in a straight line, except in so far as it is compelled by force to change that state. In considering the rotation of a body about an axis, an expression may be found which represents the sum of the products obtained by multiplying the mass of each small portion of the body by the square of its distance from the axis. This summation is called the moment of inertia of the body. The centre of inertia of a homogeneous body is the same as its centre of gravity or of mass. (*See Centre of Gravity*.)

Inertia in photography is the resistance of a sensitive emulsion to light exposure. Actually it is the exposure value required to produce the faintest developable density (threshold), and is the indication of sensitivity.

Infallibility (late Lat. *infallibilis*, not liable to error). Doctrine that the Church is preserved from error by the guidance of the Holy Spirit when pronouncing authoritatively on matters of faith or morals. It is based on the promise of Christ that the Holy Spirit should guide the Church into all truth. Probably most Christians would hold that if the entire Church—including all denominations—were agreed upon any doctrine, the fulfilment of the promise of Christ might be confidently expected. But the final schism of the Eastern and Western Churches in 1054, and the later divisions brought about by the Reformation in the 16th century, put an end to the possibility of such united councils.

The Roman Church, claiming to be the one Catholic Church, regards her councils as the oecumenical councils of the Church and claims infallibility for their judgements, a claim rejected by all other sections of Christendom. The Eastern Churches make a similar but less pronounced claim for their greater councils; while the Anglican Church recognizes the authority of only the first seven general councils of the Church. Although the doctrine of the infallibility of the Catholic Church has not been solemnly defined, the Vatican council of 1870 did define the infallibility of the pope, claiming that he pre-eminently was preserved from error. Terms of the definition are as follows:

When the Roman pontiff speaks *ex cathedra* (that is, when using his

office as pastor and teacher of all Christians, in virtue of his supreme apostolic authority, he defines a doctrine of faith and morals to be held by the whole Church), then, by the divine assistance promised to him in the person of Blessed Peter, he possesses that infallibility with which the Divine Redeemer was pleased to invest His Church in the definition of doctrine on faith and morals; and such definitions of the Roman pontiff are, of their very nature, irreformable, and not because of the consent of the Church.

According to Rome, this definition did not confer infallibility on the pope, but declares that all popes, from the earliest times, were so protected from error. Examples of the exercise of this power may therefore be quoted from papal documents before 1870, e.g. the letter of Leo to the patriarch of Constantinople, 449, defining the doctrine of the incarnation of the Son of God; or the definition in the bull Unam Sanctam, 1302, of papal power by Boniface VIII; or of the Immaculate Conception (q.v.) by Pius IX in 1854.

Since it is agreed that the opinions of the pope as a private person are not protected from error, there may be room for discussion about the infallibility of some papal documents in which it is not clear that the pope was desirous of speaking *ex cathedra* in the sense defined by the Vatican council.

Infant (Lat. *in*, not; *fari*, to speak). Term used in English law for a minor, one who has not attained the age of 21. An infant is said to be "under disability." He cannot contract so as to bind himself, except for necessities, and the question what are necessities is partly one of fact and partly one of law. Food, drink, lodging, and raiment suitable to the infant's station in life are always necessities unless it can be shown that he is already well supplied with them. Contracts of apprenticeship, if they are fair, are binding upon an infant.

Under the Infants' Relief Act, 1874, all contracts by infants for money lent or for goods other than necessities, and all accounts stated with infants, are void. Certain contracts—e.g. tenancies, partnerships—made by an infant are binding on him unless he repudiates them within a reasonable time after becoming 21. A promise to marry made by an infant is not binding, nor does it become so by his mere ratification after attaining 21.

It is a misdemeanour to invite by letter, circular, etc., an infant

to make bets or borrow money. An infant is liable for his torts (see Tort). He must always sue by some adult as his "next friend," and defend an action by his guardian *ad litem*. No infant, except a soldier, can make a valid will. He attains full age the day before his 21st birthday. See Children, Law About.

Infanticide (Lat. *infans*, infant; *caedere*, to kill). Killing of a young child. In the U.K. a woman who causes the death of her child of under 12 months at a time when she has not fully recovered from the effect of the birth and when the balance of her mind is disturbed, is guilty of this crime under the Infanticide Act of 1938. The maximum punishment is penal servitude for life. Before 1922 there was no such crime as infanticide; a mother could be charged only with murder or manslaughter, and if convicted of murder received the death sentence although it was not carried out.

In primitive communities infanticide is often conditioned by food scarcity, whether on remote overcrowded islands as in Polynesia, or in mountain habitats as with the Todas. In some Australian tribes it furnishes a welcome food-supply in times of dearth. In India the girl-infanticide formerly prevalent, and mentioned by Strabo, was due to economic causes—among the Rajputs because of the cost of dowries. Boys were flung into the Ganges under religious sanctions. Eugenic motives dictated the abandonment of feeble children in early Sparta.

Infantile Paralysis. Name formerly commonly used for poliomyelitis (q.v.).

Infantile Scurvy OR BARLOW'S DISEASE. This is true scurvy (q.v.) modified by the youth of the patient. Caused by the absence from the diet of vitamin C, it may be seen equally among the children of the uninstructed, rich and poor alike, if fed on condensed and sterilised milks and patent foods with no fresh milk or fruit juice. The condition comes on gradually between the sixth and the eighteenth months of life. Once common, it has, in western communities, become rare in its fully developed form, though mild cases sometimes occur.

While the child is left alone it is tolerably quiet, the lower limbs being kept drawn up and still; when moved it cries continuously and is clearly suffering pain in the lower limbs. Later, swellings may be detected on the limbs in the neighbourhood of the joints, and

gradually the whole limb becomes enlarged. The legs are now kept turned out and immobile, as if paralysed. Weakness of the back appears, and there may be swelling of the shoulder-blades and upper limbs. Creaking may be heard on moving the joints, and in severe cases separation occurs between the shafts and the ends of the long bones. The breast-bone presents an appearance as if it had sunk bodily back. Thickenings may occur on the skull. There may be a forward displacement of the eyeball, with puffiness of the lid. The gums are spongy and bleed easily.

Cure can be promised in about three weeks by the immediate inclusion in the child's food of 20 to 30 mgms. of vitamin C, with suitable quantities of orange or tomato juice and mashed potato.

Infant Mortality. Statistical term denoting the number of deaths of children in the first year of life per 1,000 live births. Foetal deaths, i.e. still births and abortions, are excluded from the calculation of the rate. In countries lacking an interest in ante-natal and child welfare, high levels of infant mortality are common and sometimes exceed 250 per 1,000.

Data are scanty, but it would appear that before 1900 little progress was made in lowering infant mortality and probably no country had a rate as low as 100 per 1,000. In England and Wales, for which particularly full and accurate data are available, the rate in the decade 1891-1900 was 153 per 1,000, numerically identical with the rate 50 years earlier in 1841-50, the first decade in which the necessary data were collected. After 1900 revolutionary declines have been recorded throughout the western world. The trend in England and Wales, which is typical, is shown by the following rates, taken from the registrar general's Statistical Review:

INFANT MORTALITY PER 1,000 LIVE BIRTHS			
1891-1900	..	..	153
1901-10	..	..	128
1911-20	..	..	100
1921-30	..	..	72
1931-40	..	..	59
1941-50	..	..	43

The initial decline at the turn of the century is associated with the rising awareness of the needs of maternal and child welfare, typified by the setting up by voluntary groups of child welfare clinics. Official action extended this movement; while improvement in clinical medicine, notably in the prevention and treatment of

infectious diseases, was an important factor.

Broadly, two types of infant death may be distinguished: those attributable to such causes as congenital malformations, prematurity, and accidents at birth and occurring in the first weeks of life; and those occurring later in the first year, attributable in the main to infectious disease. Reduction in the rate of infant mortality has derived far more from improvement in the second category than in the first. Infant deaths have always been concentrated more in the early part of the first year of life, and this differential reduction has accentuated this feature. For instance, in 1952 in England and Wales, death within 24 hours of birth comprised more than a quarter of infant deaths in the first year of life.

The special nature of infant deaths in the early days of life led to the introduction of two new measures of mortality: neonatal mortality, defined as deaths in the first 28 days of life per 1,000 live births; and perinatal mortality, defined as still births plus deaths in the first seven days of life per 1,000 live and still births. The second is useful because still births and deaths in the first week of life have many causes in common.

Further significant decline in infant mortality can be expected only by reducing deaths from causes that have so far been found unavoidable. The discovery of the mechanism of prematurity, for instance, would prove revolutionary. Successive declines in infant mortality in the past have frequently led to claims that the irreducible minimum has at last been reached. This is clearly false so long as there is a difference in the infant mortality rates of different social classes. (In 1950 in England and Wales, the rate for class I was 17.1 per 1,000, that for class V was 41.1.)

There are other common differentials in infant mortality, higher rates being recorded among males, twins, and illegitimate infants, first born children, and children of mothers approaching middle age.

The countries with the lowest infant mortality in 1954, according to the United Nations Demographic Year Book, were:

Sweden	..	..	..	..	18.5
Netherlands	..	..	..	..	21.1
Australia	..	..	..	..	22.5
New Zealand	..	..	..	..	24.1
England and Wales	..	..	..	..	25.5
U.S.A.	..	..	..	..	26.6
Denmark	..	..	..	..	26.9
Switzerland	..	..	..	..	27.2

Infantry (Ital. *fantaria*, young footman). General term for a body of soldiers who fight on foot and are armed with weapons carried by themselves. It is one of the four basic branches into which a modern army is divided, the others being artillery, armour, and tactical aircraft. Despite constant changes in the art of warfare, infantry remains the decisive factor in any campaign. It is the oldest branch of the profession of arms.

Originally it was a nondescript and untrained rabble having neither coordination of weapons nor tactical direction. As the advantages of training and cohesion were realized by commanders, there emerged from the mass of undisciplined foot soldiers a select body with a recognizable tactical function. To this type belonged the Greek phalanx and the Roman cohort. These were infantry, fighting in close formation as tactical units; but co-existing with them were swarms of lightly armed foot soldiers of poorer military quality whose function was to engage in preliminary skirmishing.

With the development of feudalism, the mounted knight rapidly replaced the infantryman as the main striking force. Except for a small corps of men-at-arms, infantry was simply the mass of feudal levies who could not provide themselves with horses. In the Italian principalities and city states, infantry was formed by young footmen who followed the mounted men to carry their spare armour.

Effective in Holding Cavalry

Until the close of the 11th century, infantry was of little real influence in warfare; the cavalry charge decided battles, and the defenceless infantry was indiscriminately slaughtered. The battle of Hastings is a classic example. But in the 12th century new weapons, particularly the English long bow and the Genoese crossbow, and new tactical employment of pikemen gradually gave the infantry dominance on the battlefield. The schiltrun, or circle of pikemen, a defensive unit initiated by Wallace and used at Falkirk in 1298, gave the infantryman an effective method of holding a cavalry charge. The successful combination of the resistance of pikemen and the marksmanship of archers in opposing feudal cavalry was demonstrated at Courtrai in 1302, when the burghers of Bruges destroyed the knightly force led by Count Robert of Artois. The English

archers' victory at Crécy, 1346, followed. Defensive tactics were evolved to overcome the weight and momentum which previously had enabled a cavalry charge to sweep all before it. Infantry moved in dense masses; squares of pikemen, with archers in the centre, were virtually unbreakable. About the beginning of the 15th century the long bow was replaced by the pike, while missile power was vested in the crossbow. Before firearms were effective, the pike was the supreme infantry weapon, and with it Spanish and Swiss troops, and later Cromwell's Ironsides, were the masters of European battlefields. The troops fought shoulder to shoulder in dense masses.

An Individual Combatant

During the Thirty Years' War, firearms became more powerful and easier to manipulate, and the infantryman was more of an individual combatant, requiring new discipline and tactical use. Gustavus Adolphus relied on a front six ranks deeps instead of the massed square. The foremost rank consisted of pikemen to deal with cavalry assault, while the musketeers were in the rear, loading and firing in alternate ranks.

By the mid-18th century the pike was replaced by musket and bayonet. Then emerged the line, specially favoured by the British army. It gave a wide front and maximum rifle power. But defensively the square still proved most effective in containing a cavalry charge. Napoleon's method of pouring overwhelming artillery fire into the ranks of opposing infantry before launching his own infantry attack proved too costly in casualties when foot soldiers were in line. Fresh tactics again balanced the scales in the infantry's favour. Instead of waiting in line for the attack, the infantry dispersed and took cover from the artillery barrage; when the attackers followed up, the defenders held their fire until the enemy was at point-blank musket range, when a murderous volley was followed by a bayonet charge.

Throughout the second half of the 19th century, the rapidity of fire made possible by the invention of the needle-gun necessitated the adoption of more extended order for infantry attack. In the Franco-Prussian War, the infantry advanced in open order, taking advantage of every piece of cover; only when close to the enemy did they rise to make the final assault.

The S. African and Russo-Japanese wars entailed only slight alterations in these tactics.

Further developments in infantry tactics were induced by the First Great War. Intense rapidity of fire was attained by the rifle and the machine-gun, while shells filled with shrapnel and high explosive were thrown great distances to disorganize the assembly of infantry in back areas. The soldier now required protection while waiting to attack and while moving forward. Artillery barrages, barbed wire, poison gas, tanks, and trenches were all designed to enable him to get into personal contact with the enemy or to prevent the enemy getting into contact with him. By 1915 fire power had reached such intensity that even when advancing in open formation infantry suffered enormous casualties; Passchendaele and the Somme were notorious examples, although faulty strategy and tactics were contributory factors. The tank and the creeping barrage did something in mitigation, but throughout the war infantry casualties were always disproportionately high.

The rapid development of the tank and the aeroplane between 1919 and 1939 inspired an entirely new conception. The use of infantry in the mass was abandoned, and the infantryman was trained to fight as an individual.

Cooperation with Armour

Through all the campaigns of the Second Great War, infantry worked in cooperation with armour; rarely did they assault a position without a preparatory attack by armour and artillery. Massed fire power from rifles gave place to the more destructive effect of light automatic weapons, while the rifleman himself was trained as a stalker and sniper. When advancing, individuals were well dispersed, so that at no time were there bunches of men to provide targets for the enemy; the general scheme was to infiltrate into a position rather than charge against it. That these tactics were sound was proved by the comparatively light infantry casualties suffered by the British and U.S. armies. The Russians and Germans, having almost unlimited man power, continued to believe in a modified form of the massed infantry attack, hoping to crush the enemy by sheer weight of numbers, and as a result suffered very heavy casualties.

In most modern armies the infantry tactical unit is the battalion, which, in the British service,

seldom exceeds 850 men. At the end of the Second Great War the administrative unit was the regiment, which, under the Cardwell system of 1881, has two battalions, with a territorial title. One battalion in peace time was always on foreign service; the other was at home completing the training of recruits. Each regiment had its own depot, where recruits received primary training and regimental records were kept.

After the war the reorganization of the army, which involved the inclusion of larger airborne and armoured formations, necessitated a reduction in the number of infantry battalions from two to one per regt. At the same time regts. were grouped for training, although each retained its depot. In 1957 the British army infantry establishment was completely reorganized. Thirty regiments ceased to have their individual titles and uniforms and were amalgamated to form 15 new regiments. The administrative infantry unit became the brigade and men could be cross-posted from one regiment to another within the brigade. The brigades were given territorial titles, e.g. Lancastrian, Midland, Home Counties, East Anglian, Wessex, Highland, Lowland, etc. Infantry are armed with rifles, bayonets, light and heavy machine-guns, grenades, mortars and anti-tank weapons. They no longer march long distances into action, but are carried there by brigade and divisional motor transport or by transport aircraft. See Army; Battalion; Brigade; Company; Regiment.

David Le Roi

Infant School. Place for the instruction and training of children of tender years. In the U.K. the term has been applied to the department of the public elementary school concerned with children from 5 to 7 or 8 years of age, i.e. before their entry to the junior department. The infant school is therefore the place of the first stage of primary education, and corresponds roughly to the kindergarten, though large classes often make impossible the full adoption of kindergarten methods. The Education Act, 1944, gave the name nursery schools to schools for children between 2 and 5 years of age. In Great Britain the first infant school was founded by Robert Owen in New Lanark in 1800. See Education; Kindergarten.

Infarction (Lat. *infarcire*, to stuff in). Formation of a mass of degenerate tissue which follows

the blocking of a blood vessel by a solid substance, most frequently an embolism or thrombus. Such blocking may occur in any organ, but most often in the heart, lungs, kidneys, or spleen, and if the artery blocked is large, serious results follow. When only a small vessel is blocked, other vessels in the neighbourhood take on the work of local circulation.

Infection (Lat. *inficere*, to put in, dip in, taint). Invasion of the tissues of the body by an organism which flourishes at the expense of the host. Bacteria and other infective micro-organisms may enter the body through the gastro-intestinal tract, e.g. in typhoid and cholera; through the respiratory tract, as with pneumonia; or through the skin or a mucous membrane, e.g. in tetanus. In some diseases the infection is conveyed by some special agent, as malaria is by mosquitoes.

The bacteriologist Koch laid down conditions which must be fulfilled before a micro-organism found in association with a disease can be definitely regarded as the cause of that disease. These conditions are: (a) the organism must be constantly present in the organs or tissues of the person suffering from the disease; (b) it must be possible to isolate and cultivate the organism outside the body through several generations; (c) inoculation of the isolated and cultivated organism into a suitable animal should reproduce the disease; (d) the organism must be found in the animal thus infected.

Infection by a Micro-Organism

When infection by a micro-organism occurs, the bacilli, if relatively few in number, may be quickly overcome by the phagocytic action of the blood, and the infection rapidly brought to an end. If this does not occur, the micro-organisms increase rapidly. A localised infection affects only a limited amount of tissue, and does not extend to other parts of the body, e.g. a boil or an abscess. In a generalised infection the infective organism is conveyed by the blood or lymph channels throughout the body. Signs and symptoms of an infectious disease are due to the presence in the blood of poisonous substances or toxins generated by the micro-organisms. When an infection is localised, although the organisms do not enter the blood-stream, toxins may be absorbed from the tissues, producing symptoms of illness. This condition is known as toxæmia. See Notification.

Inferi. In Roman mythology, the gods of the lower world or abode of the dead, as opposed to *superi*, the gods of heaven.

Inferior Court. Term used in English law to describe certain courts of law which have a limited jurisdiction. Superior courts are the house of lords, judicial committee of the privy council, supreme court of judicature, court of criminal appeal, and courts of chancery of the counties palatine of Lancaster and Durham. All others—e.g. county courts—are inferior courts. The proceedings of an inferior court are under the control of the queen's (king's) bench division. Whereas superior courts have jurisdiction throughout England and Wales, inferior courts have jurisdiction only over matters in a limited area. An inferior court attempting to exceed its jurisdiction may be prohibited from doing so by the queen's bench division.

Inferiority Complex. Popular term for a mental state in which feelings of guilt and unworthiness affect personality and behaviour. These feelings may be rational, i.e. caused by serious wrongdoing; but they more frequently occur in persons of good character who attach exaggerated importance to childish misdemeanours. Parents are often to blame for asking the impossible of children, e.g. control of thoughts and feelings as well as of behaviour. In serious cases the guilt may be fantastic, based on unconscious fears of committing acts of which the sufferer is incapable. Inferiority complexes are commoner in women than in men, who tend to put blame for their own faults upon others. Treatment should induce the patient to see his behaviour at its real value and build up his self-respect.

Infidel (Lat. *infidelis*, faithless). Term applied by the professors of a faith, especially Christians and Mahomedans, to those who do not hold the same religious creed. In the English version of the Pauline epistles the word infidel is used in a negative sense, signifying merely a person who did not acknowledge the faith, not one who deliberately refused to believe or positively denied it.

Infiltration. Geological term for a process occurring in the crust of the earth whereby the tendency of fluids to spread under the combined influence of surface tension and gravitation causes changes in the rocks. Water containing substances in solution carries them into other parts of

the crust. Iron, silica, lime, and magnesia are introduced into rocks by this means.

Infiltration. In military tactics, the piercing of enemy lines at a number of different points by comparatively small bodies of troops, which join up behind the enemy positions and "pinch them out." The enemy is attacked at his weakest points, his defended localities being reduced later or left with no communications to their source of supply. The capture of the Malayan peninsula by the Japanese in 1941-42 was a notable example of infiltration on a small scale. The principle had larger application in the Russian drive W. from Stalingrad to Berlin, 1943-45.

Infinite (Lat. *in*, not; *finitus*, finite). That which cannot be measured or counted, to which nothing can be added and from which nothing can be taken away. Infinite is thus distinguished from both finite and indefinite. The finite undoubtedly has limits, whether known or not; the indefinite has or may have limits, which cannot be ascertained. As a noun, the Infinite is specially used to signify God, the Absolute Being.

Infinitesimal. In mathematics, a quantity so small in comparison with other quantities being dealt with that it can for practical purposes be neglected. As first conceived, the calculus was based on the idea of infinitesimals which could be neglected, and for many years the differential calculus and the integral calculus were referred to together as the infinitesimal calculus. Demands for greater rigour, however, led to a re-development of the whole structure during the 19th century on the more precise basis of the theory of limits.

Infinitive. In grammar, a mood of a verb. It has no tense or time significance and no persons or numbers. In English it is expressed by the preposition "to" placed before the root of the verb, as in "to walk." The infinitive may be considered a verbal noun, used as either subject ("to walk is agreeable") or object ("I propose to walk"). A split infinitive, e.g. "I want you to generously give," is regarded as offensive by stylists.

Infinity. Mathematical concept. The idea of a numerical infinity arises in mathematics because the series of natural numbers 1, 2, 3, 4, . . . never comes to an end. It is also required as a solution for such equations as

$x = 1/0$. Similarly a negative infinity seems to be implied when the series of negative numbers does not come to an end, and to be required for the solution of such equations as $x = -1/0$. These concepts, at first vague, were gradually reduced to precise definition after the development of the calculus. In the theory of limits a sequence of positive terms x_1, x_2, x_3, \dots is said to "tend to infinity" or to "approach infinity" as a limit ($x_n \rightarrow \infty$) when, given any number K , however large, there will eventually come a term in the sequence such that it and all subsequent terms are greater than K .

In Euclidean geometry it was assumed that any line could be produced indefinitely in either direction—"to infinity." With the development of projective geometry, this notion was arbitrarily defined so as to have just those properties that would make all projective propositions hold without exception. Thus, it is assumed that parallel lines in a given plane meet in a point at infinity; that all the points at infinity together make up the line at infinity; that all circles pass through two points on that line—the circular points at infinity, etc.

A third approach was opened up at the end of the 19th century when Georg Cantor succeeded in defining "infinite" or "transfinite" numbers in terms of the theory of sets, and in proving several propositions about them.

Infirmity (Lat. *infirmus*, weak).

Institution for the medical care of the sick or infirm. Essentially identical with hospital, the term was applied more particularly to the medical department of rate-supported municipal institutions, such as unions and homes for poor persons. Accommodation in boarding schools for sick pupils is often termed the infirmary. An infirmary was an integral part of the old monastic establishments, the monk (or nun) in charge being called infirmarian.

Inflammation (Lat. *inflammare*, to set on fire). Natural reaction of living tissue to an injury. It is a protective process, which helps to prevent the effects of an injury from spreading and, where the tissues are not too badly injured, eventually brings about their repair. Inflammation is caused by infection of the tissues by micro-organisms, burns, blows, sprains, and irritating substances.

The first change in acute inflammation is a condition of hyper-

aemia, or increased supply of blood to the part, owing to dilatation of the small blood-vessels. The next change is exudation, the leucocytes or white blood corpuscles passing through the walls of the small vessels. In the surrounding tissue the leucocytes attack and destroy the invading micro-organism, many of them perishing themselves in the process, and forming the accumulation of white material known as pus. This process is known as phagocytosis (Gr. *phagein* to eat; *kytos*, cell), and is an important protection for the organism against attacks of disease from infection by micro-organisms.

Local Clinical Signs

Slight inflammation may terminate by complete recovery of the tissues. If, however, suppuration occurs, ulceration or necrosis of the tissues is likely to follow, permanent changes taking place and a scar being formed in the process of healing. The local clinical signs of inflammation are heat, redness, swelling, pain, and impairment of function. The relative extent to which the symptoms are manifested varies with the nature of the part involved; where dense, tough tissues are inflamed, such as those of the palm of the hand, there may be little swelling and much pain, though in adjacent parts, where the tissues are more lax, the swelling may be obvious and pain less. Pain may be felt, not only in the inflamed area, but in parts some distance from it, being transmitted by a nerve; e.g. pain from disease in the hip may be accompanied by pain in the knee.

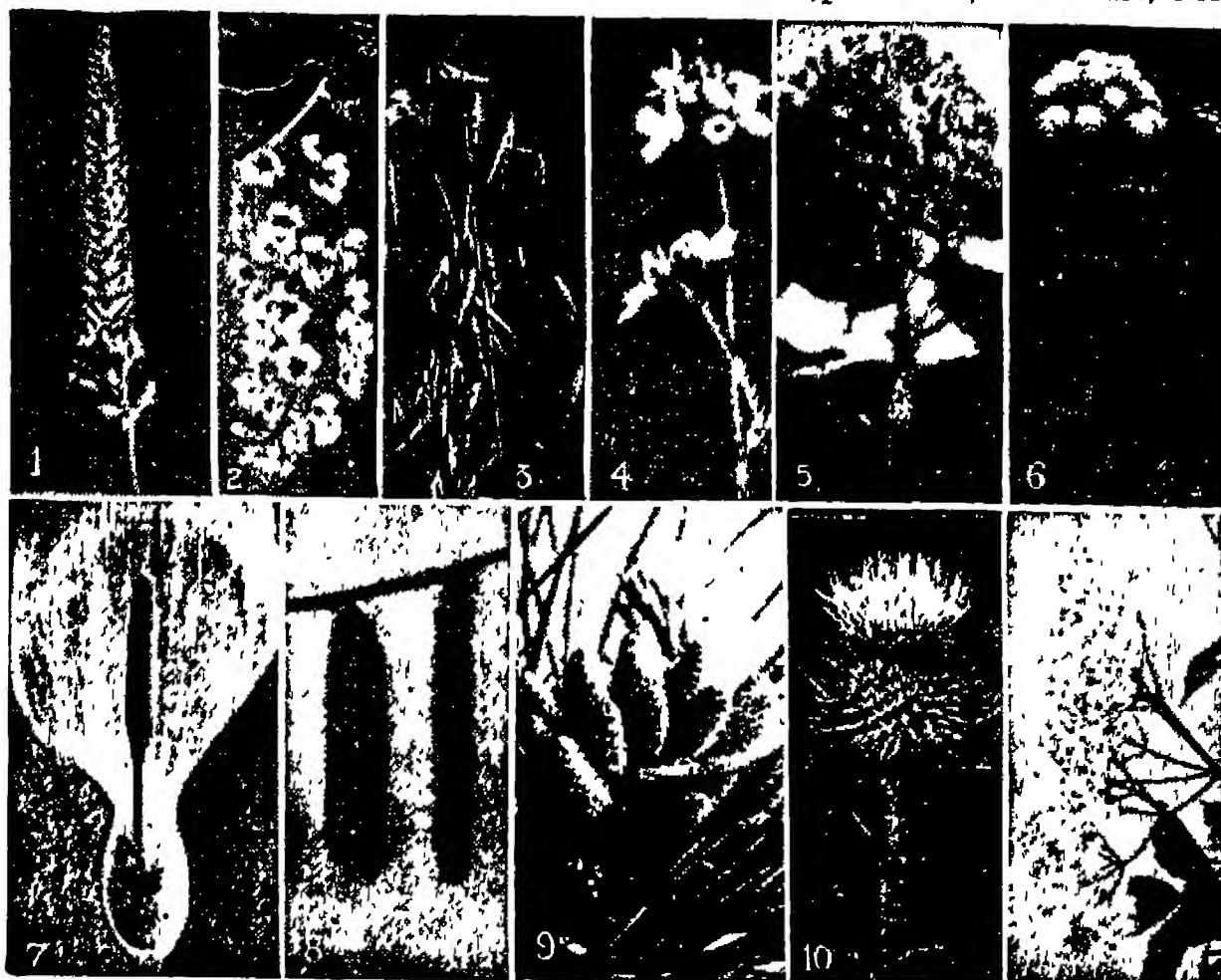
The management of inflammation consists in combating the essential cause. If micro-organisms are present they may be sensitive to penicillin or the sulpha group. Low grades of inflammation may be eased by mild exercise; acute inflammation demands complete rest. Local heat attracts fresh blood rich in unfatigued white cells to the inflamed area; or hydroscopic substances, such as glycerine, by withdrawing fluid can change the ingress of fluid to the parts, with similar result. Cold may shrink the vessels and check the inflammatory process.

Inflation (Lat. *inflare*, to blow in). Condition of being swollen with air and expanded like a pneumatic tire or toy balloon. The opposite is deflation. In economics inflationary tendencies are those which may cause a marked rise of prices. Inflation of currency occurs when government expenditure is financed

principally by loans instead of by taxes and much additional paper money is put into circulation. Prices then rise unless there is a commensurate increase in the quantity of consumers' goods, or complete price control and rationing, or a sufficient national abstinence from spending the additional money. Extreme inflation of prices may cause a community to lose faith in the currency, so that people revert to barter. Inflation benefits those

produce buds until the flowering season is over, whereas cymose inflorescence is terminated by a flower on whose stalk one, two, or more flowers arise as side branches, this process being repeated few or many times.

Racemose inflorescences are of several types. In the raceme proper the flowers are borne on stalks (lupin, bluebell). With the spike the flowers lack stalks and are tightly pressed against the stem (plantain). Catkins, such



Inflorescence. 1. Spike, plantain. 2. Raceme, snowdrop tree. 3. Panicle, oat. 4. Corymb, lady's-smock. 5. Umbel, ivy. 6. Compound umbel, water dropwort. 7. Spadix, cuckoo-pint. 8. Catkin, hazel. 9. Cone, Austrian pine. 10. Capitulum, spear plume thistle. 11. Cyme, elder

who have to pay money and impoverishes those entitled to receive fixed amounts (e.g. in payment for goods supplied, repayment of loans, interest, rent, pensions, salaries, and wages). See Credit; Prices.

Inflexion (Lat. *inflexio*, bending, modification). A change in the form of a word to denote its grammatical relation to other members of a sentence. In the noun such changes are called declension; in the verb, conjugation. The commonest instrument of inflexion is the suffix; some languages (Polynesian and Bantu) employ prefixes. See Grammar.

Inflorescence. Botanical term indicating either the manner in which flowers are borne on a plant or the actual structure thus formed. The simplest type is that in which the flower is borne singly at the end of a shoot, i.e. the flower is solitary (poppy, violet). Collections or so-called spikes of flowers may be divided into two main groups—racemose and cymose. In the former, the tip of the shoot continues to

as hazel, are pendent spikes. Racemes may be compound, and here the individual flowering stalks are replaced each by a miniature raceme, the whole inflorescence being termed a panicle. The simple raceme may have the flower stalks lengthened, so that the flowers are borne all at the same level in a corymb (candytuft). Or the stalks may vary in length but all spring from the tip of the main axis; this forms an umbel, which gives its name to the Umbelliferae. Finally we have the capitulum or head, which may be derived from a compressed umbel with flowers tightly packed together on a plate-like receptacle (sunflower.)

Influenza (late Lat. *influentia*, flowing in, influence). Highly infectious epidemic disease. It has been recognized since the 16th century, and widespread epidemics have sometimes affected a large part of the world. The so-called Spanish influenza of 1918 was prevalent all over Europe, the U.S.A., India, and Australia, the deaths in London alone averaging over 1,000

weekly. It is thought that influenza is probably due to a virus infection; but secondary infection with other organisms occurs in nearly all cases. One attack of influenza predisposes to a second. Old and young alike fall victim.

The incubation period, between the entrance of the organism into the system and the beginning of the symptoms, is about 48 hours. High temperature, pain in the limbs, catarrh, and a prostration out of all proportion to the severity of the disease, characterise it. The type of the disease depends on the physiological system attacked. If the respiratory system is attacked, cough and a bronchial picture result; if the nervous system, depression and neurasthenic symptoms are present; if the circulatory system, a toxic heart muscle with irregular heart action may be found.

The general treatment for influenza is rest, warmth, and fluid. The special system struck by the disease determines the more specific treatment. Convalescence is nearly always long and tedious. Prophylactic measures consist in isolation of the patient, and in avoidance of droplet infection from the secretions of the nose and throat. But public health and medical controls appear to have little effect on an epidemic.

In forma pauperis (Lat. in the form of a pauper). English legal term. Anyone whose income does not exceed £4 a week and who is not worth more than £100 may, on showing reasonable grounds for taking or defending proceedings, obtain a certificate from the Law Society, entitling him to take or defend these proceedings without paying any fee or costs. This applies only to civil proceedings in the high court.

Information (Lat. *informare*, to outline). Term used in several senses in English law. Until recently the crown could take civil proceedings in the courts by a document called an information instead of by writ. The information was so called because in it the law officer "informed" the court of the facts on which the claim was based. Informations were of two kinds, Latin (originally written in that language), used to recover chattels or money claimed by the crown—e.g. income tax—and English, used for the recovery of land or rights over land. These methods were abolished by the Crown Proceedings Act, 1947. It is still possible for the crown to initiate

criminal proceedings by information instead of by the usual method of indictment, the information being filed *ex officio* by a law officer; but the device has not been used since 1887. In all these forms of procedure the crown enjoyed great advantages.

Criminal proceedings could once be initiated by information at the instance of a private person, but this procedure was abolished by the Administration of Justice (Miscellaneous Provisions) Act, 1938. The word information is still applied to the statement (usually in writing) made to magistrates regarding an offence alleged to have been committed and on which they issue a summons or a warrant.

Information, MINISTRY OF. Department of the British government charged with the distribution and control of news during the two Great Wars. In 1916 a department was set up under Sir Edward Carson to take over from the foreign office the tasks of disseminating information about the British effort in the First Great War and of counteracting enemy propaganda. The department was later divided into sections, Lord Northcliffe becoming director of propaganda in enemy countries. In 1918 it passed into a ministry under Lord Beaverbrook. A select committee on national expenditure criticised some of its earlier operations, and at the end of the year it was closed down.

At the outbreak of the Second Great War the ministry was reconstituted under Lord Macmillan. After public criticism of the slow release of news and the severity of censorship, Macmillan was replaced by Sir John (later Lord) Reith, who was in turn succeeded by A. Duff Cooper in the Churchill government. In July, 1941, Brendan Bracken became the fourth minister, and Geoffrey Lloyd took his place May-Aug., 1945. The last minister, Aug., 1945–March, 1946, was E. J. Williams.

The ministry worked in close conjunction with the services, advisers being appointed by the Admiralty, War office, and Air ministry. It disseminated such news and information as the govt. thought it advisable to release about the services, enemy action in the U.K. and at sea, the progress of the war, new weapons, etc. It also published books and pamphlets; some 23,000,000 copies having been sold in the U.K. alone by the end of 1944. A film division sponsored such pictures as *Desert*

Victory, In Which We Serve, and *The Lion Has Wings*; foreign versions were distributed all over the world. Departments were maintained in allied and neutral countries, and newspapers, magazines, and books were published in many languages. The B.B.C. was responsible throughout the war to the ministry, except for broadcasts to Europe.

The ministry ceased to exist on March 31, 1946. Instead a central information office was set up, with Robert Fraser as its first director-general. Among its functions were producing official films, carrying out government publicity campaigns, arranging exhibitions, providing by cable or radio a daily news service for overseas posts, and supervising the social survey. The responsible minister was the lord president of the council.

In the U.S.A. similar services were provided by the office of war information, set up on Jan. 13, 1942. This formed a department of the office of the assistant secretary of state. Its functions corresponded closely with those of the British ministry. The office was closed by President Truman on Aug. 13, 1945, but its overseas services were carried on temporarily. On Dec. 31 the office of information and cultural affairs (O.I.C.) was set up under the assistant secretary of state to disseminate abroad information concerning the U.S.A.

Informor. In English law, a person who makes an information before a magistrate as to some offence that has been committed. On this information criminal proceedings are started by the issue of a summons or warrant. The term is also used of a criminal who approves, i.e. comes forward to give evidence against his fellow criminals. In ancient Greece persons who laid information were called sycophants (*g.v.*); in Roman imperial times the professional *delator* or informer, who often acted on the suggestion of the emperor, carried on a lucrative business. See Common Informer; King's Evidence.

Infra-red Radiation. Term for electro-magnetic radiations similar to those of light but of wavelengths too long to fall within the visible range of the spectrum. They can be taken to extend from wavelengths of 7,600 angstroms (0.000,076 cm.), the limit of visible light at the red end of the spectrum, to about 100 microns (0.01 cm.), where ultra-short wireless waves begin. Their existence was

discovered and demonstrated by Herschel in 1800.

The emission of light is accompanied by the production of heat, the two phenomena being essentially the same. Infra-red radiations include rays which give the maximum sensation of heat, and the velocity of the propagation of this heat in a vacuum is identical with that of visible light, as rendered evident by the simultaneous cutting off of light and heat during solar eclipses. If a mass of material be heated to and maintained at 400°C . it will radiate heat, though not necessarily light; but infra-red rays obey the same laws of reflection, refraction, etc., as ordinary light rays and can be focused with a concave mirror or through a lens.

Thermocouples and differential air thermometers demonstrate the existence of infra-red thermal radiation, but for more precise observations, bolometers, vaneradiometers, thermopiles, and radio balances are used. The refractive index of transparent materials is less for infra-red than for visible radiation. Ordinary glass transmits wavelengths up to 3 microns, fluorite up to 9 microns, rock salt up to 15 microns; wavelengths up to about 5 microns are said to be in the near infra-red region.

Physical science uses infra-red radiation to elucidate molecular structure. This work is based on the fact that the spectra due to changes in vibrational energy levels and in rotational states of molecules lie in the infra-red range. Chemists use infra-red radiation in establishing the percentage of carbon dioxide in flue gases. Many factories have meters incorporating an infra-red ray device which gives visual warning when chimneys emit an excess of carbon dioxide.

Infra-red rays have been used to open doors in an apparently mysterious manner as soon as anyone goes up to them. The ray is directed across the approach towards a detector which controls an electric circuit connected with the mechanism for opening the door. Whenever the ray is interrupted by the passage of a human body (or any other opaque object) the detector responds, the circuit is closed, and the door opens. A similar device is used for burglar alarms, and in some Underground rly. stations to vary the speed of escalators according to the number of people using them. It has also been adapted in industry for the

automatic counting of objects passing along a delivery belt.

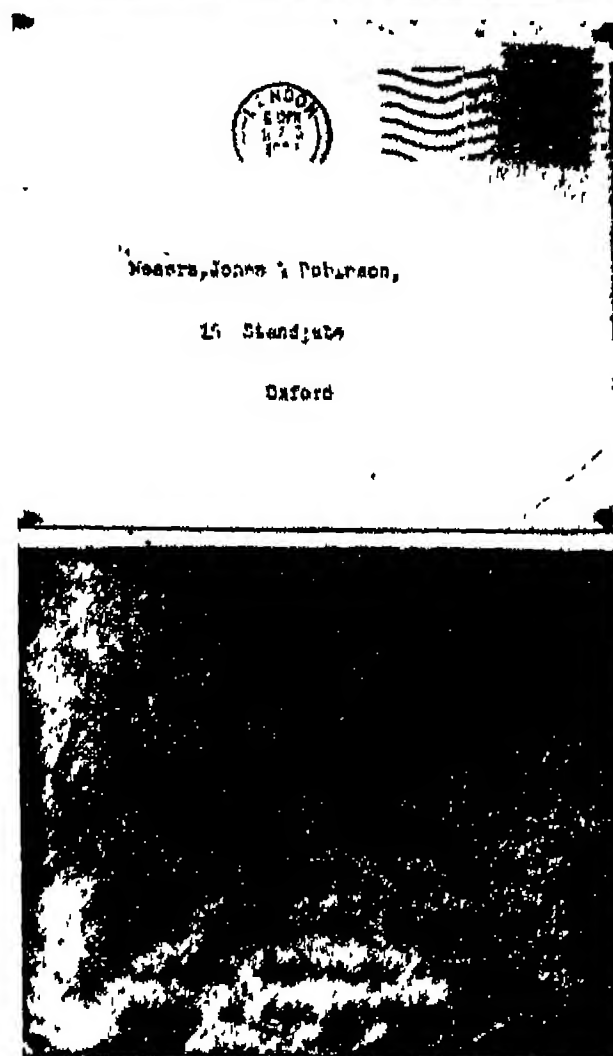
Infra-red radiation has been applied to a camera device carried by ships to enable the navigators to detect obstacles in fog. The camera is fitted to the ship on a position giving unobstructed "vision," and pressure of a button produces a developed print in less than a minute. The camera will photograph obscured objects up to a distance of 10 miles.

During the Second Great War, infra-red radiation was adapted to military uses. With a sniperscope a rifle or automatic gun can be sighted on and fired against an invisible target. The infra-red light source is suspended under the gun barrel, so that the rays project wherever the weapon is pointed; when the target is picked up it sends radiations back to the gun, where they are focused by an objective lens in a telescope. Range of sight is approx. 500 yds.

Infra-red headlamps on tanks and other military vehicles driving in complete black-out clearly revealed the road ahead for 100 yds., and picked out all but the smallest objects at 200 yds. Lamps transmitting infra-red radiation beams are used for signalling; their flashes can be picked up only by receiving scopes sensitive to this radiation. Beacons and receivers on the same principle were fitted to night fighters of the R.A.F. in 1942 and proved invaluable in enabling their pilots to identify one another during operations.

Infra-red radiations are applied medically where it is desirable to raise the temperature of the surface tissue of the human body, as in rheumatism.

INFRA-RED PHOTOGRAPHY. Photographic plates can be made sensitive to infra-red rays by the use of suitable dyes. Such plates are still sensitive to blue and violet light, so must be used in cameras fitted with a filter which transmits only infra-red rays, or the light source may itself be filtered, making it possible to take photographs in visual darkness. Direct photographs can be taken of subjects illuminated with infra-red rays up to a wavelength of about 13,500 angstroms and by indirect methods wavelengths of up to 20,000 angstroms have been recorded. Infra-red rays are the rays least scattered or diffracted by moisture or dust in the atmosphere and by haze; so by using cameras fitted with special filters and plates it is possible to record objects, even at great distances, normally invisible to the



Infra-red Photography. Two photographs of the same envelope, the lower of which, taken on an infra-red plate (by reflected, not transmitted, light), reveals pencil writing on the enclosed sheet. See further illustrations, p. 450

Photo, A. S. Quittenton, F.R.P.S.

eye. This property is of great advantage in aerial surveying. Infra-red rays are absorbed or transmitted by, or reflected from, substances according to their chemical constitution without any relation to their visual colour; hence, when photographed by infra-red rays, noticeable differences arise between subjects which are visually alike. This property is exploited in qualitative analysis and in the differentiation of dyes and pigments, many of which are comparatively transparent to infra-red radiation, as also are thin sections of ebonite and many woods. Metals and carbon are impenetrable.

Infra-red photographs help in the detection of forgeries, alterations, and erasures, and in the deciphering of burned documents. Infra-red photographs are used in medicine to record shallow subcutaneous conditions, e.g. varicose veins not visible on the surface of the skin; and in photo-micrography this penetrative power is also used extensively in order to reveal details of internal structure in subjects that are otherwise opaque. Consult *Photography by Infra-red*, W. Clark, 2nd ed., 1946.

Infundibulum. Part of the brain of a vertebrate. During development of the embryo, the floor of the large third ventricle of the brain pushes down a pocket. This is the infundibulum. It



Top. River Tay from Kinnoull Hill above Perth, winding through the Carse of Gowrie. The distance is approximately 25 m. The snow-like appearance of the fields is due to the reflection of the rays from chlorophyll (green colouring of vegetation), which is transparent to infra-red

rays. Lower: Forty-five miles across London from Kew Gardens to the Thames estuary and E. coast. Hyde Park, Battersea Park, Clapham Common, the Serpentine, the reservoirs at Barnes, and other landmarks can be easily discerned. See also Windermere, illus.; Wight, Isle of, illus.

INFRA-RED PHOTOGRAPHY: TWO EXAMPLES OF LONG-DISTANCE PHOTOGRAPHS
 Photos: Donald Bradford and The Times

becomes closely applied to another structure, an up-pushing pocket of the mouth or buccal cavity. This is the hypophysis. Both the infundibulum and the hypophysis become secretory and form the composite organ of internal secretion, the pituitary body.

Inge, WILLIAM RALPH (1860-1954). British divine. Born June 6, 1860, at Crayke, Yorks, son of a future provost of Worcester College, Oxford, he was educated at Eton and King's College, Cambridge, of which he became fellow after a brilliant career. For four years he was a master at Eton, and during 1889-1904 fellow and tutor of Hertford College, Oxford. Inge came to London in 1905 as vicar of All Saints, Ennismore Gardens, but in 1907 returned to Cambridge as Lady Margaret professor of divinity, having been Bampton lecturer. During 1911-34 he was dean of St. Paul's Cathedral, where his utterances on public questions aroused much attention. Cutting across conventional opinions, his views on society, present and future, won for him the reputation of being a pessimist—the "gloomy dean." Essentially Hellenic in outlook, the leading authority on Plotinus and a critical student of Plato, sympathetic towards mysticism, the dean was an original, powerful, and honest thinker. His views are contained in *The Church and the Age*, 1912; *Outspoken Essays*, 1919; *Lay Thoughts of a Dean*, 1926; *Christian Ethics and Modern Problems*, 1930. He died Feb. 26, 1954. *Pron. ing.*



William Ralph Inge,
British divine

Ingelow, JEAN (1820-97). British poet and novelist, born at Boston, Lincs, March 17, 1820.



The publication of a series of poems in 1863, containing the fine ballad *The High Tide on the Lincolnshire Coast*, first established her reputation, which was enhanced by *A Story of Doom*, 1867. She wrote stories for children, and novels, of which the best known is *Off the Skelligs*, 1872. She died at Kensington, July 20, 1897.

Ingersoll, RALPH McALLISTER (b. 1900). U.S. journalist. He was vice-president of the firm publishing *Time*, *Life*, and *Fortune*, 1935-40. Then he founded the New York daily, *P.M.* A private in the army in 1942, he rose to be staff colonel, serving under Gen. Devers, F.-M. Montgomery, and Gen. Bradley in the liberation of W. Europe. In a provocative book, *Top Secret*, 1946, he attacked Montgomery's generalship. He also wrote *Report On England*, 1940; *The Battle is the Pay Off*, 1943.

Ingersoll, ROBERT GREEN (1833-99). American politician and lecturer. Born at Dresden, N.Y., Aug. 11, 1833, son of a Congregational minister, he studied law, was admitted to the bar, and became attorney-general for Illinois in 1868. Developing remarkable power as an orator, he used this gift largely as an opponent of Christianity and the Bible. He spent a large part of his income in charity. His works include *The Gods and other Lectures*, 1876; *Some Mistakes of Moses*, 1879; *Great Speeches*, 1887. They were issued in 12 vols., 1900. Ingersoll died July 21, 1899.

Ingleborough. Mountain of the W. Riding of Yorkshire, England. In the Pennine range, the



Ingleborough. This peak of the Yorkshire Pennines, seen from across the village of Ingletton
Frith

peak is 8 m. N.N.W. of Settle and is 2,373 ft. high. On the summit are remains of an Iron Age hill town surrounded by a wall. It is best ascended from Clapham, where there is a rly. station. Ingleborough Cave consists of a series of passages in the limestone about 1,000 yards long, filled with stalactites, stalagmites, and other natural formations. On the lower slopes of Ingleborough is the pot-hole *Gaping Ghyll* (*q.v.*).

Inglis, ELSIE (1864-1917). A Scottish surgeon and Red Cross organizer. Daughter of an Indian civil servant, she was born Aug. 16, 1864, at Naini Tal in the United Provinces, and educated

at Edinburgh university. Shortly after the outbreak of the First Great War she gave up a flourishing practice in Edinburgh to inaugurate for war service the Scottish women's hospitals (*q.v.*), staffed entirely by women, and went in 1915 to Serbia. She and her fellow workers rendered incalculable service, not only among the wounded but during the devastating typhus epidemic. Taken prisoner when the Austro-German armies overran the country, she was later released, and in 1916 attached herself to the Southern Slav volunteer corps fighting with the Russians. With this unit she went through the Rumanian retreat. She died Nov. 26, 1917. *Consult Life, Lady F. Balfour*, 1918.

Ingoldsby Legends, THE. Fantastic stories in prose and verse, written by R. H. Barham (*q.v.*), under the pseudonym of Thomas Ingoldsby, and published 1837-47. The legends in verse are supremely good of their kind, the author's exuberance being wonderfully employed alike in tragedy and drollery. The metres are racy and the rhymes often novel and brilliant. The most widely known is *The Jackdaw of Rheims*.

Ingolstadt. Town and former fortress of Bavaria, Germany. It is 50 m. N.N.W. of Munich, on the left bank of the Danube, at an alt. of 1,200 ft. Founded as an estate of Charlemagne, endowed with urban rights in 1250, Ingolstadt was the residence of one of the Bavarian dukes from 1392 and the seat of a univer-

sity from 1472 until it was transferred in 1800 to Landshut. It was a centre of the humanist school, and from 1549 the headquarters of the Jesuits in Bavaria. Ingolstadt had three huge gates of the old fortress; a palace of the 15th century, now an art gallery; the *Frauenkirche* (1425), and two Franciscan churches (13th and 17th century); and gabled private houses. Its industries were metal work, woodwork, and trading in grain and hops. Pop. (1935) 28,836.

Troops of the U.S. 3rd army fought their way into Ingolstadt with dive-bomber support on April 26, 1945, clearing it of German forces next day. It lay

in the U.S. zone of occupation after the Second Great War.

Ingot (A.S. *in*, in; *goten*, poured). Mass of metal cast in a mould to a suitable size, weight, and shape for subsequent treatment. Ingot steel is a convenient block form in which steel from a converter is cast preparatory to subsequent working, such as rolling. See Casting; Steel.

Ingraining. Art of dyeing with fast colours. The word grain was once used for kermes and cochineal insects (*q.v.*), from which scarlet dyes were originally derived. Substances that are ingrained are dyed with fast colours, i.e. they are dyed in such a way that the colour penetrates the actual fibres of the material. Ingrain colours are formed either by the union of a dyestuff in the fibre with a mordant or by the decomposing of a soluble compound into an insoluble one in the fibres. Ingrain carpets are those which have been treated by one of these processes, the wool or worsted used having been dyed in the grain before manufacture. See Dyes.

Ingram, HERBERT (1811-60). A British journalist. Born at Boston, Lincs, May 27, 1811, and apprenticed to a local printer, in 1834 he joined Nathaniel Cooke in a printing, book-selling, and newsagent's business in Nottingham. Later he moved to London and



Herbert Ingram,
British journalist

started *The Illustrated London News* (*q.v.*), May 14, 1842. He was M.P. for Boston, 1856 to Sept. 8, 1860, when he was drowned with his son Hugh in the wreck of the *Lady Elgin* steamer on Lake Michigan. His body was recovered and buried in Boston, where a statue was erected in 1862.

Ingram, JOHN KELLS (1823-1907). An Irish economist. Born in co. Donegal, July 7, 1823, he was educated at Newry and Trinity College, Dublin, where he obtained a fellowship and in 1852 became professor of oratory and English literature. In 1866 he exchanged his chair for that of regius professor of Greek. Although a fine classical scholar, a talented mathematician, and a sound philosopher, it was as an economist that Ingram won European fame. His *History of Political Economy*, 1888, and *History of Slavery*, 1895, are his

most memorable works. Librarian and later vice-provost of Trinity, he died May 1, 1907. He wrote the poem, *Who fears to speak of '98?*

Ingram, REX. Professional name of Rex Fritchcock (1892-1950), Irish-American film director. Born and educated in Dublin, he emigrated to the U.S.A. in 1911. After being a sculptor, and going on the stage, he wrote scenarios for Fox Films. He made his name as a director with *Four Horsemen of the Apocalypse*, 1922. He brought Rudolph Valentino and Ramon Navarro to fame. In the 1920s he directed *The Prisoner of Zenda*, *Mare Nostrum*, *The Garden of Allah*; in 1940, *The Thief of Bagdad*. He died July 21, 1950.

Another Rex Ingram, a negro actor, made his name in the film *Green Pastures*.

Ingres, JEAN AUGUSTE DOMINIQUE (1780-1867). A French painter. Born at Montauban, Aug. 29, 1780, son of a versatile exponent of many arts, after studying at Toulouse, he entered David's atelier in Paris in 1796. He showed



J. A. D. Ingres,
French painter
Self-portrait

marked proficiency in the academic style, and when, in 1806, he proceeded to Rome, where he resided until 1820, he devoted himself to an exhaustive study of Raphael and the Old Masters. He then lived for some years in Florence. He remained a pronounced uncompromising adherent of the classical school all his life. His drawing, usually unimpeachable, was often superb in its combination of strength and suavity, but his colouring was thin and cold. Recognition came only slowly, but by 1825 his reputation was firmly established in Paris, where he was able to open a school. He succeeded Vernet in the directorate of the French School in Rome in 1834, remaining there until 1841, and was named a senator in 1862. He died in Paris, Jan. 14, 1867, leaving over 3,000 drawings and many paintings to the town of Montauban. His most famous works include *Oedipus and the Sphinx*, 1808; *An Odalisque*, 1819; *Jesus Giving the Keys to St. Peter*, 1820; *The Apotheosis of Homer*, 1827; *Joan of Arc*, 1854; and, best known of all, *La Source*, 1856, now in the Louvre and one of the most perfect repre-

sentations of the nude human figure ever painted. His portraits are distinguished as much by harmonious composition as by their fidelity to character.

Inhabited House Duty. Tax levied by the British government on dwelling houses of all kinds if worth £30 a year and over. It was introduced in 1851 and repealed in 1924.

Inhambane. Coastal dist. and town of Mozambique, Africa. It is fertile and contains good agricultural land, but numbers of natives emigrate for a period to the Transvaal mines, where they form a considerable proportion of the workers. Its area is about 33,000 sq. m. and the pop. perhaps 750,000. The port of Inhambane, capital of the district, is situated between Lorenzo Marques and Beira, and possesses a spacious harbour. One of the oldest Portuguese settlements on this coast, Inhambane is the terminus of a coastal rly. which is being constructed from Lorenzo Marques, and is connected by rly. with Chai-Chai on the Limpopo river. Pop. 20,000.

Inheritance (Lat. *in*, in; *heres*, heir). In English law, before 1926 the rules of inheritance determined who was the heir of a person who died intestate, the heir being entitled to the real property of the deceased. Since 1925, both real and personal property pass to the next-of-kin of the deceased. See Hereditament; Primogeniture.

Inhibition (Lat. *inhibere*, to hold in). Term used in psychology to indicate that an activity of the body or mind is prevented from functioning normally as a result of some disturbance of the emotions. The commonest causes of an inhibition are fear or anxiety. For example, in an examination a candidate may be unable to give the answers that he knows quite well. In some instances there may be a loss of voice when called upon to speak or sing in public, or a loss of memory under severe stress. Many people fail to do their best when faced with competition or the possibility of criticism because they are blocking their mental or physical reactions through fear of failure.

The tracing of such reactions, with the help of a competent psychologist, to their origin, and the uncovering of the unrecognized forms of fear, will frequently relieve or completely cure such conditions.

Inhibition (Lat. *inhibere*, to hold in). Term used in English ecclesiastical law. It is a command

from a bishop to a clergyman in his diocese, prohibiting him from performing any clerical function. See Ecclesiastical Law.

Inishmore. Largest island of the Aran group, Irish Republic, 30 m. S.W. of Galway. It is 9 m. long by 2 m. broad; the inhabitants are employed mainly in fishing. See Aran Islands.

Initial (Lat. *initialis*, adj. beginning). In printing, a large letter placed at the beginning of an article in a newspaper or periodical, or of a chapter in a book. At one time spaces were left to be filled in by blocks of an ornamental character, a practice adapted from old missals and other illustrated MSS. Modern custom favours the use of a letter, called a 2-line letter, double the size of the type in which the body of the text is set up.

In its plural form, initials, the word means the first letters of a person's name, often written or printed in place of the full signature. In English law they are generally as valid as a full signature. Under the Statute of Frauds and the Sale of Goods Act, where contracts in writing, and signed, are required in certain cases, it has been held that initials, or even a billhead with the name of the contracting party printed at the top, constitute a sufficient signature. When a party to a legal instrument makes a cancellation or alteration or interlineation, he should write his initials near it.

Initial Velocity. Correctly, the speed of a projectile the moment its charge is fired; more generally, the speed of the projectile through the air at the instant its base leaves the muzzle of a firearm. It is the maximum velocity of the projectile during its flight; thereafter velocity drops the farther the projectile travels. The initial velocity of a .303 rifle bullet is 2,400 ft. per sec., but with special streamlined bullets it is increased by 450 ft. per sec. Initial velocity of artillery projectiles is generally higher than that of a rifle bullet and depends upon the calibre of the gun and the weight of the charge.

Initiation (Lat. *initium*, beginning). Term signifying introduction into a society, business, or office. It is more particularly used of admittance to a secret organization, and is accompanied by certain rites and ceremonies. In primitive culture these rites concern especially ceremonial introduction into the privileges and duties of adult life. Associated with them may be periods of instruction which repre-

sent the higher education of civilized society. The preparation of novices, usually at puberty, may last for weeks or even years. The initiates may be isolated from their families and the other sex, and may undergo physical mutilations, e.g. circumcision, tattooing.

The final mysteries are usually unfolded in a magico-religious atmosphere designed to arouse awe, enhanced by such mystic devices as bull-roarers and sacred masks. The formal initiation may comprise simulation of death and resurrection, acquisition of a new name, vesture, and ornaments, explanation of sacred objects, rehearsal of tribal lore by pantomime or earth-images, and, above all, directions regarding married life, social intercourse, etc.

Initiative. In politics, the power of originating legislation. In the U.K. the initiative in regard to bills of a financial nature is with the house of commons, and the initiative on all important legislation rests in practice with the government. Some political reformers are in favour of an extension of initiative to the people, something on the Swiss model. In Switzerland if 30,000 citizens present a petition for the revision or annulment of a measure passed by the legislature, it must be submitted to a referendum. The same course must be taken if the demand is made by eight cantons.

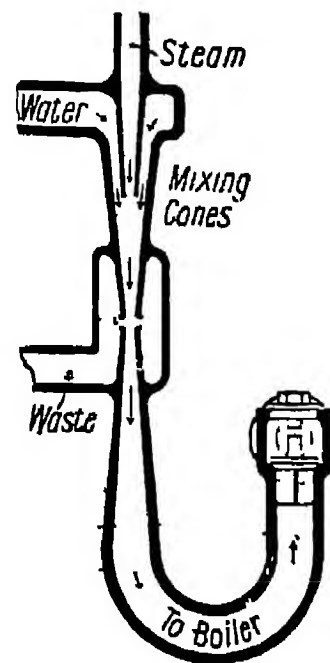
In military strategy and tactics, an army is said to hold the initiative when it is in the position to force upon the opposing side its own choice of time, place, and conditions of battle.

Injection (Lat. *injectio*, throwing in). In medicine, a general term for introducing from without a substance into an organ or tissue. An injection may be made into the rectum—enema—for the purpose of supplying food material (nutrient enema) or fluid, when the normal function of the upper gut is cut off, or for softening a faecal mass. Hypodermic injections are solutions of drugs introduced by a hypodermic syringe and needle under the skin into a muscle or a vein. They are used in varying conditions where absorption from the intestinal tract is uncertain, or where quick result, or prolonged activity of the drug, is necessary.

Injector. Device in which the velocity of high pressure steam or compressed air is used to move fluids or gases through pipes or other channels. If the apparatus be designed primarily as a feeder, it is termed an injector; if as a

remover, an ejector. The principle is the same in both.

The diagram shows an injector to force water into a steam boiler. Steam is admitted through a jet into a conical chamber, connected with a water supply. During the building up of the steam pressure, a proportion of the steam escapes through the overflow or waste. The vacuum set up in the chamber causes water to enter the chamber, where it is caught up by the steam



Injector. Diagram illustrating principle of working. See text

—which it condenses—and carried at high velocity into a cone having at the bottom a non-return valve. The expansion of the cone towards the valve converts the momentum of the water into pressure sufficient to open the valve and deliver the water to

the boiler, whence the steam comes.

An injector is usually so constructed that the distance between the two cones can be adjusted by moving one cone, to alter the area of the annular space between them and facilitate starting up and economical working. In the vacuum brake systems used on steam rly. locomotives an injector (or ejector) of similar type exhausts the air from the train brake pipeline. See Brake; Steam Engine.

Injunction (Lat. *injungere*, to bid, enjoin). A term of English law. It means an order of the court prohibiting a defendant from doing something which he has started to do, or threatens to do. At common law this remedy did not exist; but it was invented by the court of chancery, the common law remedy of damages being often inadequate. As a rule, injunctions are negative: they are commands to refrain from doing something; but in rare cases the court will grant a mandatory injunction, commanding something to be done. A plaintiff who issues his writ can, as a rule, on showing that the defendant threatens or intends to do something which would injure him, obtain an interlocutory injunction at once, to restrain the mischief until the trial of the action. In the case of libel, however, the court will hardly ever grant an interlocutory injunction.

INK AND INK MANUFACTURE

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This article gives an account of the various kinds of ink. See Gall Wasp; Tannin; also Printing; Typewriting; Writing

Ink (Lat. *encaustum*) is a liquid medium by means of which more or less permanent characters may be produced upon any material. The principal kinds are (1) writing; (2) copying; (3) drawing; (4) marking; (5) printing; (6) typewriter; and (7) inks for special purposes.

WRITING INKS. The earliest writing inks consisted of a mixture of lampblack with a solution of glue or gum. Such inks are still used in China, Egypt, and the East, but have long been replaced in Europe by inks made from iron and galls. This transition from carbon inks of the Eastern type into the modern inks took place very gradually, and was not complete until the 14th century or later. When such materials as crushed galls, myrobalans, divi-divi, or chestnut bark are soaked in water they yield a solution of tannin, and this has the property of combining with iron to form a tannate of iron, which darkens on exposure to the air and forms another tannate of iron which is nearly black and does not dissolve in water. Galls produced by the gall wasp or other insect are the principal source of tannin for ink.

The iron salt most commonly used by ink manufacturers is iron sulphate or copperas, and it is essential to the manufacture of a good and stable ink that the correct proportions of these ingredients be used. Naturally, this varies with the composition of the tannin material, but, speaking generally, the proportions that have been found to give the best results are one of copperas to three of galls. If too little iron be present, the writing fades. An ink to be reasonably permanent should contain not less than 0.2 per cent. of iron, while for a standard documentary ink at least 0.5 per cent. of iron should be present. The iron tannate is the main constituent of iron gall ink, but as such a solution by itself is unstable, a small proportion (about 0.1 per cent.) of an acid is added to prevent the ink from changing in the bottle. The ink is then left to mature for a month or more in the ink vats.

In the older types of inks the preparation was exposed to the air before bottling to make it dark, but in the modern blue-black inks a provisional colour such as indigo or aniline blue is introduced to give colour to the writing pending the formation of the true ink pigment of iron tannate. A small amount

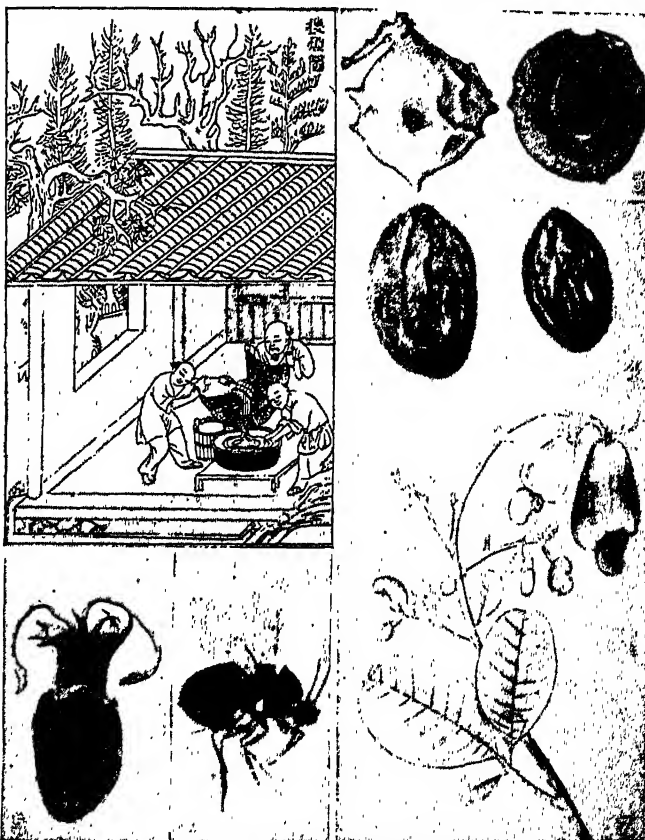
of carbolic acid is generally added to prevent mould, and in some inks a little gum is used. Acid-free inks are made from gallic acid, which is separated from the galls. The compound of iron and gallic acid can be made stable in solution without adding mineral acid.

The colouring matter of log-wood, haematoxylin, combines with salts of metals, notably potassium chromate, to form an ink, but such inks lack the permanency of iron gall inks and are chiefly employed in schools, where a cheap ink is the first consideration. Aniline inks consist mainly of solutions of aniline dyes, and a preservative, sometimes having the addition of a small amount of gum. Red ink, for example, is usually a solution of eosin (q.v.).

COPYING INKS. Any ordinary iron gall ink will yield a copy for some time after writing, but in order to get better results, a larger proportion of copperas, galls, and dye is used, together with a small amount of a substance, such as glycerin, to prevent too rapid drying of the ink.

DRAWING INKS. These include sepia, extracted from the dried ink-sac of the cuttle fish, *Sepia officinalis*; Indian ink, composed mainly of fine lampblack and glue; and the so-called "waterproof ink," which consists of a pigment or colouring matter suspended in a liquid medium such as a solution of shellac.

MARKING INKS. Various plants produce juices which form a permanent stain on exposure to the air. One of the best known of these is the Indian marking nut, *Semecarpus anacardium*, the brown juice of which turns black on contact with lime or an alkali, and is used in the U.S.A. as the basis of a



Ink. 1. Ink-makers mixing glue and lampblack (from a Chinese print). Natural sources of the tannin used in ink are shown—whole and in section—in 2 and 3, Aleppo gall, produced by the gall fly or wasp (6); also in 4, myrobalans, dried East Indian astringent fruits resembling the prune. The dried sac of the cuttle fish, 5, yields sepia used in drawing ink, and from the Indian nut, *Semecarpus anacardium*, 7, is derived a juice forming the basis of a marking ink

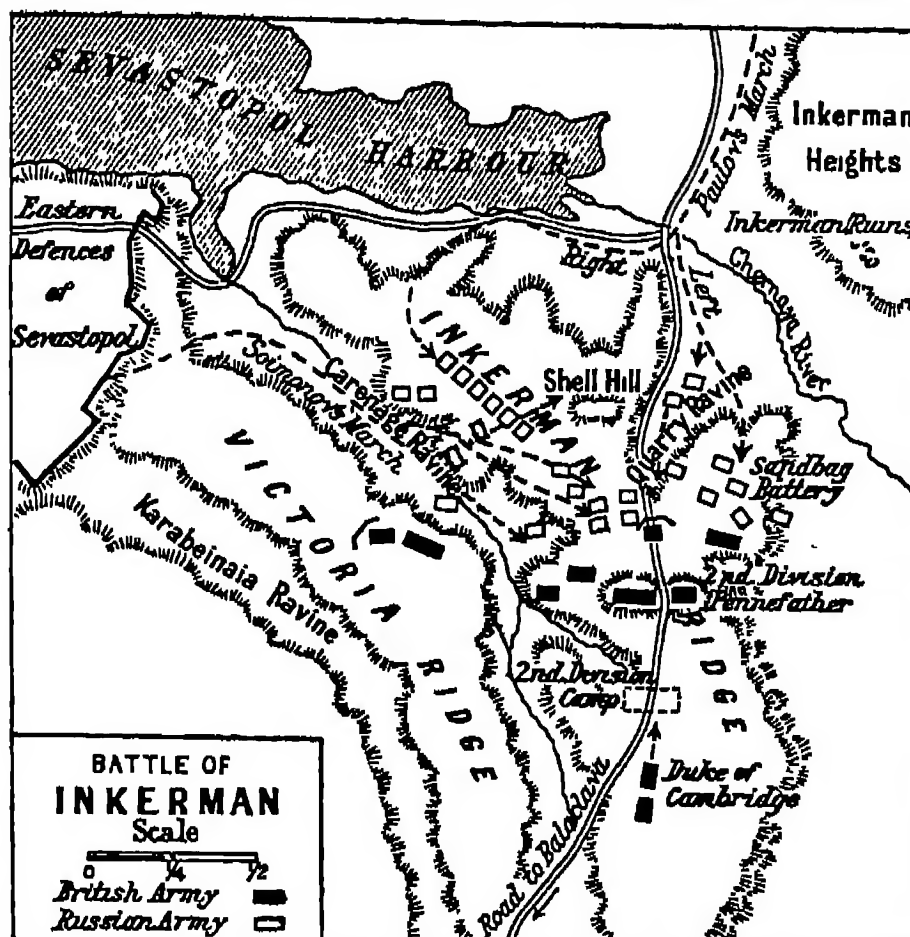
marking ink. The best known chemical marking inks are preparations of silver salts, such as silver tartrate, which become black on exposure to light, the process being accelerated by the application of heat. More recent preparations consist of solutions of aniline salts, which, when treated with an oxidising agent, *e.g.* sodium chlorate, in presence of a metallic salt, *e.g.* copper chloride, yield an insoluble deposit of aniline black. These two portions of the ink are usually kept separate until just before use, but "one-solution" aniline inks may also be obtained.

PRINTING INKS. These are composed of a fine pigment, such as lampblack, gas black, ultramarine or Prussian blue, incorporated with a liquid drying medium such as boiled linseed oil, with the addition of various ingredients such as soap, resins, etc. Essentially, printing inks are a special kind of oil paint.

TYPEWRITER INKS frequently consist of a solution of methyl violet with a suitable thickening agent, such as glycerine or oil. The black inks contain an aniline dye, such as nigrosine, or a finely divided carbon pigment.

INKS FOR SPECIAL PURPOSES. These include cancelling inks, which are essentially dilute printing inks; cheque inks, containing ingredients to prevent forgery; stamping inks, usually special solutions of aniline dyes, which dry rapidly; and inks of special composition for writing upon glass, wood, metal, leather, and the like. To this class also belong inks for secret writing, which became important during the First Great War. Most consist of a colourless liquid, *e.g.* a solution of gallic acid, which forms a coloured compound, *i.e.* an ink, on treatment with the solution of a substance such as copperas. Others are composed of the juices of plants, *e.g.* lemon juice, which darken on paper when heated.

TESTING INKS. Chemical tests show the approximate age of inks.



Inkerman. Plan of the battlefield showing the disposition of the forces and the lines of the Russian attack

Modern blue-black inks may be distinguished from old iron gall inks by treatment with oxalic or acetic acid. Iron gall inks can be distinguished from those in use during the early Christian era, since the basis of all ancient inks was a form of carbon, by the application of a dilute bleaching agent.

Inkerman, BATTLE OF. Fought during the Crimean War between



Inkerman. Cliff with ruins of Genoese fortifications. Top right, convent built in the cliff

A more serious attack was made on the morning of Nov. 5. Under cover of a fog a strong force of Russians from Sevastopol reached the British outposts before being seen. They were in superior numbers, for the British had only about 6,000 men here, chiefly the 2nd division, and at once they seized Shell Hill and got their heavy guns into position thereon. The mist, however, and the

promptitude of Pennefather, the general commanding the 2nd division, threw their plan out of gear, and after a confused fight between the infantry the Russians fell back, their general having been killed.

Another large Russian force had by now arrived and delivered another attack. This centred round a small battery, known as Sandbag battery, which a few British defended desperately against assault after assault. Reinforcements, British and French, soon arrived, and there were a number of small counter-attacks. Eventually the guns planted by the Russians on Shell Hill were silenced. The British lost about 2,400 out of 8,500 engaged; the French lost over 900. The Russian losses were placed at 11,000 or 12,000 out of 42,000 engaged. The fight lasted about seven hours. See Balaclava; Crimean War.

Inkhorn. Small portable receptacle, made of horn, wood, or metal, for holding ink and sometimes writing instruments. At one time they were in common use in Europe, and are still used in parts of the East.

Inkpen. Village of Berkshire, England. It is 4 m. S.E. of Hungerford and near it are Inkpen Beacon, 954 ft., and Walbury Hill, 975 ft., culminating heights of the Sydmorton Hills that run through Berks, Hants, and Wilts, highest chalk downs in England.

Inland Revenue. Name given in the United Kingdom to certain items of the national revenue. It



Inkhorn carried by Eastern scribes

the British and the Russians, Nov. 5, 1854. Inkerman Ridge, overlooking Sevastopol, was held by the British during the siege of that fortress, and here the Russians attacked them on Oct. 25, but were repulsed without difficulty.

includes income tax, the various death duties, and stamp duties, but excludes the revenues from customs and excise. The collection of inland revenue duties is supervised by the board of inland revenue (*v.i.*).

Inland Revenue, BOARD OF. Body responsible for collecting a great part of the national revenue of the U.K. Originally, in 1694, commissioners of stamps were appointed, and a little later commissioners of taxes; in 1834 a board of stamps and taxes was established. In 1849 the board was amalgamated with the commissioners of excise and given its present name, which it retained after 1909 when the task of collecting the excise duties, performed by it for 60 years, was transferred from it to the board of customs. The board has a chairman and other commissioners, and is responsible for collecting the income tax, with surtax, death duties, and stamp duties. Its chief offices are at Somerset House, London, and it has branches in Edinburgh and all over the U.K.

Inland Sea. Almost entirely landlocked basin in Japan. It lies between S. Honshu and the smaller island of Shikoku, and extends for 240 m. from Osaka Bay to the Strait of Shimonoseki, with a width varying from 3 to 30 m. It communicates with the Pacific Ocean by the Straits of Akashi and Naruto, between which lies the isle of Awaji, and the Strait of Hayasui between Shikoku and Kyushu.

The sea comprises a number of basins joined by narrow, island-studded channels. In late Tertiary times the sea filled in a fracture between the fold mountains of Honshu and Shikoku, thus making the basin, which resembles in character and formation the similar narrow arms of the sea on other portions of the Pacific coast. In places only from 50 to 90 ft. deep, the sea is deepest at Hayasui Strait, 541 ft. Tides rise from 6 to 14 ft., and entering from both sides cause complicated currents, with speeds from 7 to 10 knots, and eddies, which impede navigation. The sea requires skilful pilotage. Among fish obtained here are sea bream and grey mullet. The

granite rocks of the coasts, backed by the symmetrical cones of distant volcanoes and the green of pine forests, give the voyage from Kobe to Moji an element of charm. During the Second Great War U.S. aircraft sealed off the three entrances to the Inland Sea with mines.

Inland Voyage, AN. First volume published by R. L. Stevenson. It appeared in 1878 and describes a holiday trip which he and Sir Walter Simpson took in canoes on the Sambre and the Oise in 1876. They started from Antwerp and, passing along the canals, reached the Oise. The little volume contains some charming musings.

Inlaying. Production of ornamental designs on wood, metal, or other substance by fitting the design, of thin material, into the surface. As the fitting is perfect and the finished outer surface level, the design shows chiefly by difference in colour. Some work of high quality is engraved. The process is used in furniture and some classes of metalwork. Furniture requires woods of different natural colours, together with dyed woods, also tortoiseshell, metal, ivory, and mother-of-pearl.

Applied to furniture, the term strictly means cutting out a surface, which is inlaid. Under A. C. Boule (1642-1732), cabinet-maker to Louis XIV, veneer was made, although the manufacture had originated in Italy. Conventional floral and other patterns were cut in the veneer or metal sheet, and into counterpart pieces of coloured wood, tortoiseshell, or metal, the fragments being pieced together into one flat surface. The whole was then laid with adhesive on a prepared wooden ground. This was marquetry in contradistinction to inlaying; it also originated in Italy. Inlaying became relegated almost exclusively to narrow lines and bands.

Sometimes two or more lines of different coloured woods are inlaid

side by side, or there may be one single line. Bands may be to a pattern, bound together on the edges with lines. In the Empire period inlay and marquetry were of brass. Probably as the result of the evolution explained, marquetry furniture is commonly designated inlaid furniture.

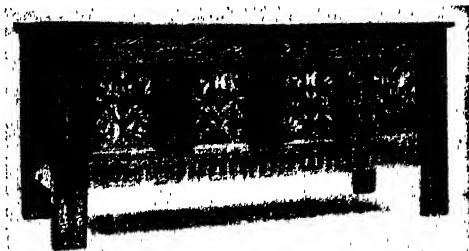
The insertion of shell in bone, and of bone in wood, introduced in the Neolithic age, is widespread in primitive culture. In early Egypt the incrustation of gold jewelry with coloured stones is traceable to the XIIIth dynasty. Stone and ivory inlays, greatly favoured in ancient Tartary, may have been carried thence to the Crimea, whence they spread to W. Europe in the early Iron age. Coral inlay, known in Britain before 300 B.C., was displaced by vitreous paste, thus giving rise to the art of enamelling. In early Byzantine times silver inlay on bronze was practised and passed into the Saracenic art of gold and silver inlay on copper or iron, especially from the 12th to the 16th century. It survives in India, China, and Japan. Agate and other stones, when inlaid in marble, produce *pietra dura* work. A choice style of medieval Chinese lacquer was inlaid with mother-of-pearl. See Biddery; Cabinet-making; Damascening; Furniture; Marquetry.

Walter Coventry

In Loco Parentis (Lat. in the place of a parent). Legal phrase describing the relationship in which guardians and schoolmasters stand towards the infants whose custody is entrusted to them, involving the right to control their movements and regulate their behaviour. The king is said to stand *in loco parentis* to all the infants in the kingdom. See Children, Law about.

Inman, PHILIP ALBERT INMAN, 1ST BARON (b. 1892). British administrator. Born June 12, 1892, he was educated at Harrogate and Leeds. Chairman of a publishing co. and director of a hotel co., he was long chairman of Charing Cross Hospital. Raised to the peerage 1946, he was chairman of the B.B.C. 1946 until his appointment, 1947, as lord privy seal. He was chairman of the hotels executive of British Rlys. 1948-51. In 1952 he published *No Going Back*, an autobiography.

Inman, MELBOURNE (1873-1951). English billiards professional. A Londoner, he became marker at the Twickenham club when 14. Long supreme among English players, he developed a game which brought him world cham-



Inlaying. Early 17th century English oak chest, inlaid with holly and bog oak

Victoria and Albert Museum, S. Kensington

pionships 1908-09, 1912-14, 1919. He was eventually beaten by Willie Smith. He died at Farnborough, Kent, Aug. 11, 1951.

Inman, WILLIAM (1825-81). British shipowner. Born at Leicester, April 6, 1825, he was educated at Liverpool, and in 1849 became a partner in the merchant firm of Richardson Brothers. In 1850 he dispatched the City of Glasgow, screw steamer of 1,600 tons, full of emigrants to Philadelphia. This was the beginning of the Inman Line, which in 1857 extended its operations to New York under the title of the Liverpool, New York, and Philadelphia Steamship Co. Inman died July 3, 1881.

In Memoriam. Poem by Tennyson written in memory of his friend at Cambridge, Arthur Hallam (1811-33). It was printed privately for presentation to a few friends in 1850, and the same year published anonymously. The most deeply felt of Tennyson's works, it expresses his grief, but can also "faintly trust the larger hope." The metre, which has come to be called after this poem, had been employed by Jonson.

Inn. House where travellers and others are fed and lodged for gain. The word is a form of in (within), and means primarily a lodging in relation to its inmate. The earliest inns were the caravanserais and khans of the East, where lodging was provided. In the stable of such an inn Jesus was born.

Greek and Roman inns were little more than drinking shops, but Roman posting-houses on great roads were superior establishments closely resembling the later inns. In the Middle Ages hospitality was provided chiefly at castles, country houses, and monasteries. The old inns were usually built in the form of a hollow square, the great yard, entered by an archway with massive gates, being surrounded by galleries, upon which the bed-chambers opened. From the Elizabethan period down to the 18th century the inns were the resort of wits, poets, and writers. During the coaching period they enjoyed great prosperity, which declined with the coming of the railways. Bicycle and motor car revived the fortunes of the roadside inn.

Memorable among English inns is the Tabard, Southwark, built in 1307, the starting point of Chaucer's *Canterbury Pilgrims*. After being partly destroyed by fire in 1676, it was rebuilt in the original style, but was demolished

after 1870. At Canterbury the Pilgrims put up at the Chequers of the Hope, of which the lower part of the walls and the crypt alone survive. London taverns associated with great Elizabethan writers are the Mermaid, in Bread Street, the scene of many "wit combats" between Jonson and Shakespeare, the Devil Tavern near Temple Bar, the Three Cranes in the Vintry, and Mistress Quickly's tavern, the Boar's Head, in Eastcheap. The Mitre, in Fleet Street (since demolished), was Dr. Johnson's favourite haunt.

One of the most picturesque of English inns is the exquisite half-timbered Feathers at Ludlow, with its magnificent carved front and beautiful ceilings, panelling, and fireplaces; but this was not originally an inn. Other good examples of so-called "magpie" or "black-and-white" inns are the Old Hall at Sandbach (originally the manor house), the Bear's Head at Brereton, the Swan and Lion at Congleton, the Bear and Billet at Chester, formerly the town mansion of the earls of Shrewsbury, and the Pounds Bridge Inn between Penshurst and Speldhurst, Kent, which was built as a residence by a former rector of Penshurst.

The Luttrell Arms at Dunster, Somerset, is a fine 15th century building, supposed to have been the town residence of the abbots of Cleeve. Over the stone porch, which has two arrow slits, is the carved stone sign—the arms of the Luttrell family. The windows overlooking the courtyard are beautifully carved, the oak room has a Gothic hammer-beam roof, and in a bedroom is a 17th century plaster overmantel in high relief. Of the few galleried inns that survive, the finest is the New Inn, Gloucester (see illus. in page 4509), built 1450-57 to accommodate pilgrims to the shrine of the murdered Edward II.

There are galleries at the George, Huntingdon, remains at the Bull, Dartford, the George, Winchcomb, and a two-storeyed one at the George, Southwark. The King's Head, Aylesbury, now a public house, is supposed to have been either a refectory of Grey Friars or a guildhall. It has a magnificent oak window with fine stained glass, and in the taproom a massive oak cornice and moulded ceiling ribs meeting in a carved boss. The George, Glastonbury, has its original Perpendicular stone front (see illus. in page 4509). The frontage of the Star at Alfriston

has fine carvings and is roofed with large slabs of Horsham stone.

The Maid's Head, at Norwich, has a Jacobean bar, a 15th century fireplace, and a Norman cellar. The George, Norton St. Philip, formerly a Carthusian hostel, consists of a massive stone ground floor and a timber upper storey. The Ostrich (perhaps a corruption of hospice) at Colnbrook, originally a hospice given in trust to the Benedictine abbey of Abingdon, is an interesting example of an old coaching inn. In the upper storey of the frontage was a door through which passengers from the top of the coach were able to step straight into the house. See Hotel.

Bibliography. *Tales of Old Inns*, R. Keverne, 1939; *The Old Inns of England*, A. E. Richardson, new ed. 1942; *English Inns*, Thomas Burke, new ed., 1944.

Inn. River of Europe. It rises in a small lake in the canton of the Grisons, Switzerland, and flows through the Engadine. Having entered the Austrian Tirol, it flows by Innsbruck and, leaving Austria near Kufstein, enters Bavaria and joins the Danube at Passau. It is about 310 m. long, and its course is mainly N.E. In its earlier course it is a rapid and beautiful mountain stream; in Bavaria it is a great river with islands thereon, and brings down a great bulk of water to the Danube. Its main tributaries are the Salzach and Alz. Navigable for small vessels from below Innsbruck, in its lower course it forms part of the W. Austrian frontier.

Inner Circle. Section of London's underground rly. system. Built, 1863-84, by the Metropolitan railway, it runs round the cities of London and Westminster from Notting Hill Gate in the W. to Aldgate in the E. It serves, among other things, as a connexion between the various London termini, e.g., Liverpool St., Cannon St., Charing Cross, Victoria, Paddington, King's Cross. The line was electrified in 1905 and in 1933 was absorbed by L.P.T.B. From 1872 to 1905 there were an Outer Circle, L.N.W.R. and Metropolitan District rly. between Broad Street and Mansion House via Willesden Junction; and a Middle Circle, G.W.R. and Metropolitan District rly. between Moorgate and Mansion House via Hammersmith.

Politically, the term inner circle is applied to the higher executive posts in the British cabinet; usually the prime minister, lord

president of the council, foreign secretary, chancellor of the exchequer, and lord privy seal. The inner circle of the Magic Circle (g.v.) consists of the most expert conjurers and illusionists.

The inner circle of a standard rifle target is that part surrounding the bull, the other circles being the magpie (middle) and outer.

Inner House. Name given to the upper court of the court of session of Scotland. It is the court of appeal from the outer, or lower, house. It sits in two divisions, each of four judges, who bear the title of lord. The president of the court of session presides over one division and the lord justice clerk over the other.

Innerleithen. Burgh and parish of Peeblesshire, Scotland. The burgh stands on Leithen Water, near where it falls into the Tweed, 6 m. S.E. of Peebles. Woollens are made, and the place is visited for its mineral springs. The parish church and other buildings are modern, as before about 1790 this was only a small village. The spring is supposed to be Scott's S. Ronan's Well. Near the town are Traquair (g.v.) with its old palace, Walkerburn with its antiquities, and Horsburgh Castle. The old name was Hornehuntersland. Pop. (1951) burgh, 2,361; parish, 3,622.

Inner Temple. In England, one of the four inns of court. As an inn of court it dates from about 1440, and with the Middle Temple made its home in the house of the Knights Templars in London. See Barrister; Inns of Court; Temple.

Innes, ARTHUR DONALD (1863-1938). British historian. Son of a soldier who became a general,

he was born in India, Sept. 15, 1863. Educated at Marlborough and Oriel College, Oxford, he was for a time on the editorial staff of Cassell & Co. Associate editor

of Harnsworth's *History of the World*, he also lectured at the School of Oriental Studies. His many books include a *History of the British in India*, 1902; *History of England and the British Empire*, 1913-14; *Class-book of European History*, 1929-30; *Colonial and Maritime Expansion of England*, 1932. Innes died April 19, 1938.

Inness, GEORGE (1825-94). An American painter. Born at Newburgh, N.Y., May 1, 1825, and virtually self-taught, he chose most of his subjects from his native land, but resided for periods in France and Italy, and died during a tour in Scotland at Bridge of Allan, Aug. 3, 1894. He was elected to the National Academy in 1868. Notable pictures were *The Apocalyptic Vision of the New Jerusalem*, and *The River of Life* (from the tenets of the Swedenborgian Church, to which he belonged); also *Moon Rise in Florida*, *American Sunset*,* and *S. Peter's from the Tiber*.

Innholders' Company. London city livery company. Originating in the 14th century among



Innholders' Company arms

hostelers and hay-mongers, it received a charter in 1514 inscribed to the art and mystery of S. Julien le Herbageur, patron saint of travellers. At the time of its incorporation inns were beginning to take the place of monastic establishments as resting places for travellers, and every tavern keeper was compelled to belong to it. Other charters followed in 1663, 1664, and 1685. The hall, in College Street, E.C., was reconstructed about 85 p.c. in 1885-86. The first hall, in existence in 1522, was burnt in 1666 and replaced in 1668-70.

Innisfail or **INISHFAIL.** Poetical name for Ireland. It means the island of the fall, this being the stone of destiny on which Jacob is supposed to have slept when journeying. The belief was that it was brought to Ireland and used as the coronation stone. See *Lia Fail*.

Inniskilling Dragoons, 5TH ROYAL. Cavalry regiment of the British army. Raised by G. Hamilton, a governor of Enniskillen, N. Ireland, for service against James II in 1689, it was taken on the British establishment as the 7th Horse. Later called the 5th Dragoons (Inniskilling), it absorbed the 6th Dragoon Guards in 1922. It served with Marlborough at Blenheim, Ramillies, Oudenarde, and Malplaquet. The 6th Dragoons fought at the Boyne, and in 1743 won a battle honour at Dettingen under George III. The 5th Dragoons were at Salamanca and Vittoria in the Peninsular War, and the 6th fought at Waterloo. Both regiments were in the charge of the

Heavy Brigade at Balacava. The 6th served throughout the first Boer War, 1881, and both were in the S. African War of 1899-1902, when the 5th took part in the defence of Ladysmith.

Their combined honours from the First Great War included Mons, Le Cateau, Marne, 1914; Messines, 1914; Ypres, 1914, '15; Somme, 1916, '18; Cambrai, 1917, '18; Amiens, Hindenburg Line, Mons, 1918. Mechanised in 1936, the 5th Royal Inniskilling Dragoons served early in the Second Great War in France. They then formed part of the armoured reserve in the U.K. against the possibility of a German invasion. Landing in Normandy in July, 1944, the regiment joined the 7th armoured div., with which it continued to serve, except for a short attachment to the 53rd (Welsh) div., until the German capitulation.

Inniskilling Fusiliers, ROYAL Regiment of the British army. For its gallant defence of the town



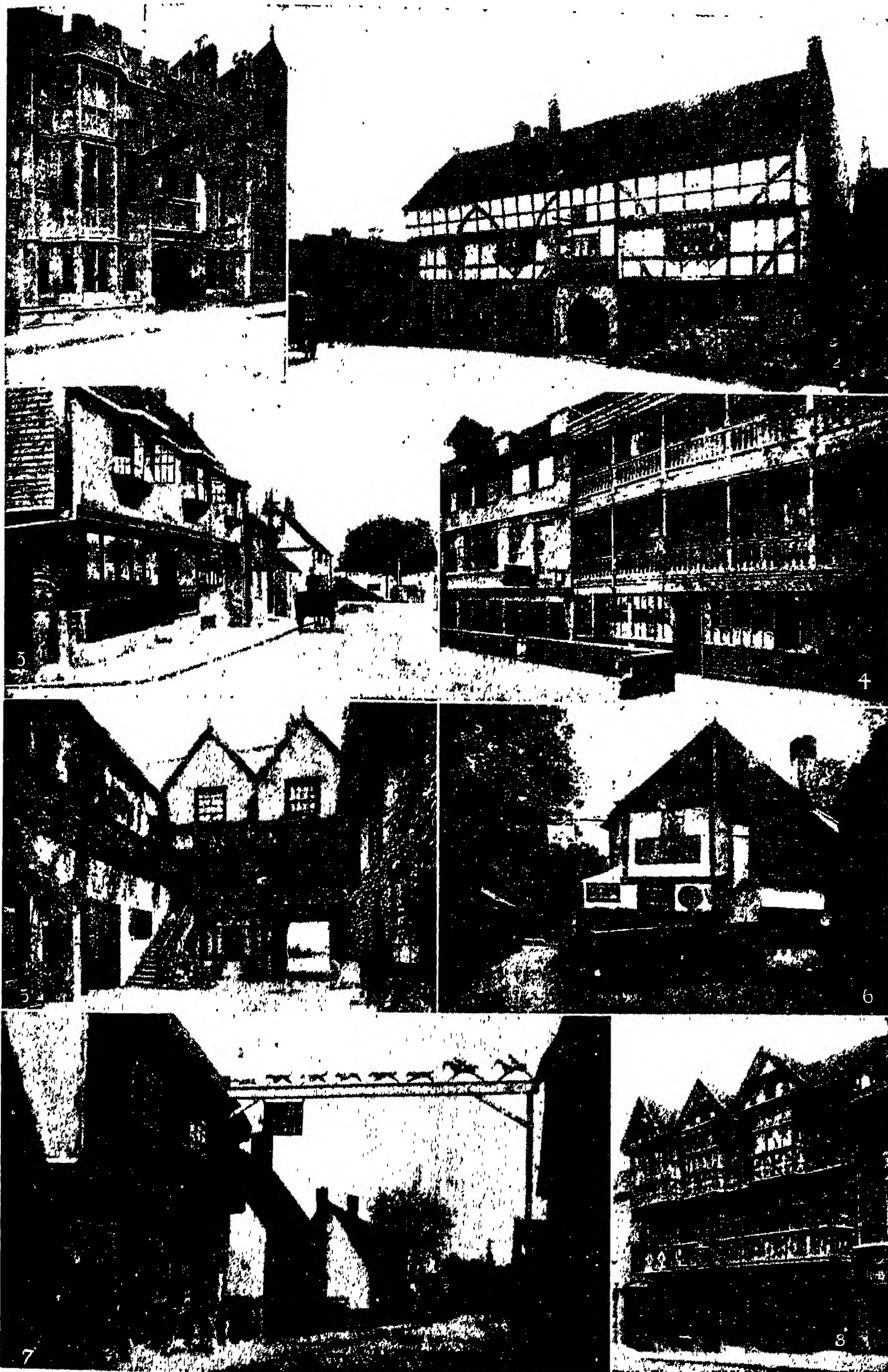
Inniskilling Fusiliers badge

of Enniskillen, N. Ireland, in 1689, part of the garrison was formed into two regiments, the 27th Foot (Inniskillings) and the Inniskillings (6th Dragoons). The former fought in Canada and gained its first battle honour at Martinique in 1762. In 1801 it helped to capture Alexandria. The regiment distinguished itself at Maida in 1806, gained eight honours in the Peninsula, and was at Waterloo. Then followed service in S. Africa, and in Central India during the Mutiny.

In 1861 the 27th Foot received its title of Royal Inniskilling Fusiliers, and in 1888 the 108th Foot was constituted the 2nd battalion; the latter had been raised in 1854 as the 3rd Madras Europeans in the East India Company's service. Part of the Irish Brigade, the regiment took part in the relief of Ladysmith. Thirteen battalions were raised for the First Great War and earned the battle honours: Le Cateau; Somme, 1916, '18; Ypres, 1917, '18; St. Quentin; Hindenburg Line; France and Flanders, 1914-18; Macedonia, 1915-17; Gallipoli, 1915-16; Palestine, 1917-18. During the Second Great War, battalions were in France, Madagascar, Persia, N. Africa, Sicily, and Italy. The depot is at Omagh, Tyrone.



A. D. Innes, British historian



1. The George, Glastonbury, a 15th century pilgrims' hostelry. 2. The George, Norton St. Philip, Somerset, probably the oldest English inn, 15th cent. 3. The Star, Alfriston, 16th cent. 4. The George, Southwark, and, 5, The New Inn, Gloucester, two well-known coaching houses. 6. The Fighting Cocks, St. Albans, originally a monastic building. 7. The Fox and Hounds, Barley, Herts, with its old sign across the road. 8. The Feathers, Ludlow, a timbered building of 1603

INN: SOME OLD HOSTELRIES OF THE ENGLISH ROADS

By arrangement with Country Life

Innkeeper. One who keeps a house where travellers are provided, for profit, with board and lodging and whatever they may require while on their journey. Innkeepers are bound to receive and entertain for a reasonable time at a reasonable charge any traveller applying for admission if there is accommodation available and the applicant behaves properly.

Innkeepers are liable for loss of or injury to their guests' goods, money and baggage, and are responsible for the acts of their servants and also for those of other guests. The Innkeepers Act, 1863 exempts them from liability for loss or injury to goods or property, other than horse or other animal or carriage, brought to the inn, to an amount exceeding £30, unless such property has been stolen or injured through default or neglect on the part of the innkeeper or his servants or has been expressly deposited with them for safe custody. On the other hand, innkeepers have a lien on the goods of guests for board and lodging, and after six months may sell by public auction any property left behind by a guest leaving in debt, provided they advertise their intention of doing so at least one month beforehand.

Innocent. Name of 13 popes. Innocent II, a Roman pope, 1130-43, was disturbed by the rival claim of the anti-pope Anacletus II (d. 1138). Innocent IV, pope 1243-54, renewed the excommunication against the emperor Frederick II, and finally at the council of Lyons, 1245, deposed the emperor and ordered a new election. Innocent V, the first Dominican pope, only reigned from Jan. to June, 1276. Innocent VI, pope 1352-62, was a Frenchman named Aubert, who reigned at Avignon.

Innocent VII was pope 1404-6 during the schism of the anti-pope Benedict XIII. Innocent IX, when 72 years old, was pope Oct.-Dec., 1591. Innocent X, pope 1644-55, was largely dependent on the counsel of his sister-in-law, Olimpia Maidalchini. Innocent XIII, pope 1721-24, was the son of the duke of Poli.

Innocent I (d. 417). Pope 402-417. A native of Albano, he was brought up in the service of the Church at Rome, and made pope on the death of Anastasius I. His correspondence is the chief authority for his life. He was active in dealing with prevalent heresies, and in maintaining the supremacy of the Petrine see.

Innocent strongly supported John Chrysostom when he was wrongfully ejected from the see of

Constantinople. In response to an appeal from five African bishops, he confirmed the condemnation of Pelagianism by the African synods. Rome was attacked by the Goths under Alaric in 408, during his pontificate, but when the city was sacked in 410 the pope was absent on an embassy to the emperor Honorius at Ravenna to try to arrange terms of peace. He died March 12, 417 and was declared a saint. His festival is kept on July 28.

Innocent III (1160-1216). Pope 1198-1216. The son of Count Trasimund of Segni and nephew of Clement III, he was born at Anagni. Educated at Rome, he studied theology at Paris and law at Bologna. He held various offices under four popes from 1181-91; was created cardinal, and on the death of Celestine III, Jan. 8, 1198, was elected his successor.

The restoration of the temporal power of the papacy in Rome and Italy, the reconciliation of the spiritual and temporal power in Europe, and the recovery of the Holy Land, were the primary objects of Innocent's pontificate. In Germany the coronation in 1198 of Philip of Swabia and Otto, son of Henry the Lion, as candidates respectively of the Ghibelline and Guelph parties, established two rival claimants to the imperial crown. The pope, without entirely committing himself at first, showed favour to the Ghibelline candidate, but in July, 1201, he announced his approval of Otto, publishing his famous *Venerabilem* (May, 1202), which, while maintaining the right of princes to elect their head, reserved to the pope the right of approving or annulling their choice. On the murder of Philip in 1208 Otto, at the pope's invitation, was crowned emperor at St. Peter's, Rome.

Almost at once, however, Otto seized estates to which the Church had a claim. Innocent excommunicated him and, turning to the French king and the German princes, induced them to elect in his place the young king Frederick II of Sicily, who owed that kingdom to the good offices of the pope. The conclusion of the struggle enabled Innocent to crown his work by calling a general council at the Lateran, Nov., 1215, which proclaimed the fifth crusade.

The pope's sphere of influence

was by no means confined to Germany. Soon after his accession he ordered the warring kings of France and England to come to terms or to agree to a five years' truce. From Scandinavia, where he adjudicated in the matter of succession to the Norwegian throne, to Bulgaria, whose king received his crown at the hands of the papal legate in 1204, the pope exercised his claim to spiritual overlordship, but his most marked triumph was in England when John made an abject submission to him. The crusade against the Albigenses was ordered by him after the failure of other measures and the murder of the papal legate.

During the preparations for the fifth crusade, Innocent died at Perugia, July 16, 1216. He was one of the greatest of the popes, and under him the pontifical authority was much increased. His body was removed to the Lateran from the cathedral of Perugia by order of Leo XIII, 1891. *Consult* Life, L. E. Binns, 1931.

Innocent VIII (1432-92). Pope 1484-92. Born at Genoa, the son of a Roman senator, Giovanni Battista Cibò became bishop of Savona in 1467. He was made a cardinal in 1473, and on Aug. 29, 1484, was elected pope. His efforts to provide for two children, born to him out of wedlock before his ordination, caused scandal. He declared Henry VII to be king of England; and tried to rouse Christendom to crusade against the Turks. His support of the French against the Aragonese king of Naples led to his being besieged in



Popes Innocent. Left to right, Innocent I, Innocent III, and Innocent XII

the Vatican by disaffected Roman nobles. He died July 25, 1492.

Innocent XI (1611-89). Pope 1676-89. Born at Como, May 16, 1611, Benedetto Odescalchi was educated in his native city by the Jesuits, and studied law at Rome and Naples. By Urban VIII he was appointed to various offices in the curia, and in 1647 was created cardinal. From his election to the papacy, Sept. 21, 1676, his pontificate was mainly taken up by the struggle against the encroachment of Louis XIV of France.

In reply to the pope's opposition to his extension of the right over vacant sees, Louis convoked an assembly which, as the declaration of the French clergy, put forward the four articles embodying the doctrine of Gallicanism. This was condemned by the pope, 1682, who refused to accept the nomination to bishoprics of those clergy who had taken part in the assembly. Louis seized the papal territory at Avignon and threatened a schism. The scant sympathy manifested by the pope with James II of England was due to the latter's support of the French king. The doctrine of quietism was condemned by Innocent in a decree of 1687, and his leniency to the Jansenists was long used as an argument against his beatification. He died Aug. 11, 1689, and was beatified in 1956.

Innocent XII (1615-1700). Pope 1691-1700. Antonio Pignatelli, a Neapolitan, born March 13, 1615, entered at 20 the Roman curia. He was successively nuncio to Tuscany, Poland, and Vienna, made cardinal in 1682, and archbishop of Naples in 1687. He was elected pope in succession to Alexander VIII by way of compromise, July 12, 1691. By bull, issued 1692, he forbade any pope to make more than one of his relatives a cardinal. He healed the breach with France by obtaining from Louis XIV a repeal of the declaration of the clergy, and confirming those bishops whose appointment Innocent XI had refused to sanction. He died Sept. 27, 1700.

Innocents Abroad, **THE**. Humorous travel book by Mark Twain (S. L. Clemens), published in 1869 with the full title of *The Innocents Abroad; or, the New Pilgrims' Progress: Being Some Account of the Quaker City's Pleasure Excursion to Europe and the Holy Land*. See Twain, Mark.

Innocents' Day, **HOLY INNOCENTS**, OR **CHILDERMAS**. Holy day of the Christian Church. It is observed in the West on Dec. 28, in the Greek Church on Dec. 29, in memory of the children massacred by Herod in Bethlehem (Matt. 2). Regarded as adding to the solemnity of Christmas, Innocents' Day has been observed since the 4th century. In England before the Reformation the day was observed by the use of mourning vestments, muffled peals, and processions of children.

Innominate Artery (Lat. *innominatus*, unnamed). Branch of the aorta or main blood-vessel of the human body. It lies behind the upper part of the breastbone.

Innominate Bone. The hip-bone. The innominate bones, one on each side, are united in front and separated behind by the sacrum, the whole ring of bones forming the pelvis. The hip-bones transmit the weight of the body to the lower limbs. Each bone consists of three parts, the ilium, ischium, and pubis, which are separate in early life. The ilium forms the upper expanded part of the bone, and is bounded superiorly by a crest which can be felt externally at the side of the lower part of the abdomen. The external surface gives attachment to the gluteal muscles (*q.v.*). See Hip-joint.

Innsbruck. Town of Austria, capital of Tirol. It stands mainly on the right bank of the Inn, at a height of 1,880 ft., 60 m. S. of Munich. Picturesquely situated, it is sheltered on the N. by lofty peaks, and the climate is pleasantly mild during winter. The old town near the Inn bridge contained the Goldnes Dachl, a roof of gilt copper over an elaborate balcony dated 1500 and connected with Maximilian I, and the Franciscan church, built about 1550 to contain the emperor's monument. This was an imposing cenotaph of marble surrounded by bronze statues, among which that of King Arthur as a German knight was noteworthy. The church showed a memorial to Andreas Hofer (*q.v.*), whose name is also connected with Berg Isel, S. of the town, where fighting took place in 1809, and with the Golden Eagle inn, from which he harangued the people. Near the Hofburg was the church of S. James (18th century), with altarpiece by L. Cranach the elder.

The university, founded 1672, had a library of over 200,000 volumes. Close by was the Ferdinand museum, with collections mainly of Tirolese interest, including a picture gallery in which old masters were represented. In the suburb of Wilten, to the S., was a great church in the baroque style belonging to

an abbey founded, it is said, in the 12th century. Here was the site of the Roman station Veldidena. Innsbruck had many street memorials, including a triumphal arch set up in 1765 to celebrate the wedding of Maria Theresa's son Prince Leopold, afterwards Leopold II, to Maria Louisa of Spain.

Until the Second Great War Innsbruck was a popular tourist resort. It has several industries, including cotton manufacture, the making of mosaics, and glass painting. Since most of the rly. traffic for the Brenner pass into Italy goes through it, Innsbruck was a target for Allied bombers during the later stages of the war, suffering considerable damage. It surrendered May 4, 1945, to the U.S. 7th army. Pop. (1951) 95,055.

Inns of Court. Name of four English legal societies possessing the exclusive right of calling persons to the bar. They were so called from affording residence to members. Originating in the 13th century, they include benchers (or senior members), barristers, and students, and are managed by the benchers, who are coopted. They are Lincoln's Inn, Inner Temple, Middle Temple (*see* Temple), and Gray's Inn, are on a footing of equality, governed by no prescribed legal provisions, statute, or charter, virtually exempt from the orders, jurisdiction, or interference of the courts, and possess a right to disbar any member for misconduct, subject to a right of appeal to the judges. By the Sex Disqualification (Removal) Act of 1919, membership of the inns is open to women, as it is to citizens of all nations except in wartime.

In the 16th century lesser inns or hostels were subject to the control of the four great inns. At one time a law student served an apprenticeship in an inn of chancery before he joined an inn of court. The inns of chancery, whose connexion with the inns of court exists no longer, were Clement's, Clifford's, Staple, Lyon's, New, Strand, Thavies', Furnival's, and Barnard's Inns. There were also two Serjeants' Inns, members being serjeants-at-law, the last of whom died in 1899.

In Scotland the Faculty of Advocates has similar powers and functions. See Bar; Barrister;



Innsbruck, Austria. Maria-Theresienstrasse, the main street of the capital of Tirol

and under the names of the various inns; consult also Early Holborn and the Legal Quarter of London, E. Williams, 1927; Wig and Gown, R. J. Blackham, 1932; History of English Law, W. S. Holdsworth.

Innuendo (Lat. *innuere*, to nod, to hint). In English law, the defamatory meaning which the plaintiff alleges the words to bear in a libel and slander case. Thus, the plaintiff will charge that the defendant said, "He is a lame duck," implying that the plaintiff was a man who could not pay his debts. The words in italics are called the innuendo, which literally means "by hinting."

Ino. In Greek mythology, daughter of Cadmus, king of Thebes. She married Athamas, king of Minyae in the Boeotian Orchomenus.

Inoculation. The introduction under the skin or into a muscle of a measured quantity of killed micro-organisms of certain diseases, or of their toxins, in order to protect the patient against the specific disease. Inoculation is made by a hypodermic syringe. Several inoculations, increasing in strength, may be spaced over some time, affording a protection which varies in duration. Inoculation is useful because of its challenge to the white cells and to the whole protective mechanism of the body; stimulated by the presence of the enemy substance, these cells react in anticipation of attack and so are adequate to repulse the living micro-organism should it invade the tissues.

Inönü, İSMET (b. 1884). President of Turkey. Born Sept. 24, 1884, at Smyrna (Izmir), he attended military and staff colleges, and served as a corps commander during the First Great War. A life-long friend and collaborator with Kemal Atatürk, he organized the nationalist army, and as chief of the general staff played a leading part in defeating the Greeks at the battle of İnönü in 1922. With the introduction of family names in Turkey in 1934, he chose to commemorate his victory. As foreign minister he signed the Lausanne treaty of 1923. He then became the first premier of the republic, a position he held 1923-24, and again 1925-



İsmet İnönü,
Turkish President

37. On Atatürk's death in 1938 he was elected president.

Inönü continued his predecessor's policy of carrying out reforms, and after the defeat of France in 1940 affirmed Turkish non-belligerency and friendship for Great Britain in face of aggressive Axis policy in S.E. Europe. He met Winston Churchill at Adana in Jan., 1943, to discuss the strengthening of Turkish forces by increased supplies of Allied equipment, and in Dec. attended a conference at Cairo with Churchill and Roosevelt. Re-elected president 1943 and 1946, he became leader of the opposition in 1950.

Inositol or **INOSITRE**. White substance, $C_6H_{12}(OH)_6$, with a sweet taste, first found in the muscle fluid of the ox's heart. It has since been discovered in young French beans (*Phaseolus vulgaris*), and hence is also called phaseomannite. Other vegetable substances yield inositol, and it is conveniently prepared from walnut leaves. It is one of the growth factors essential for certain yeasts.

In pari delicto (Lat., in equal fault). Term of English law. If A sues B, alleging an illegal act, and it is disclosed that the whole transaction between them was illegal, and both are guilty, the plaintiff fails. For example, money deposited as security for refreshments to be supplied to a brothel has been held irrecoverable.

In Partibus Infidelium (Lat., in countries of the unfaithful). A R.C. term for titular bishops. In the 13th century the success of the crusades induced the popes to establish sees within Mahomedan countries. On the relapse of these districts into infidel hands, however, the incumbents of these sees were unable to occupy them, but the titles were retained in *partibus infidelium*. Until the pontificate of Leo XIII in *partibus* sees were conferred on coadjutor bishops and dignitaries who, for one reason or another, were not installed in actual cures. Until 1850 R.C. episcopacies in Great Britain were held by in *partibus* bishops.

Inquest (O. Fr. *enquête*, from Lat. *inquisitum*, passive part. of *inquirere*, to inquire into). Judicial inquiry. Historically it is intimately associated with trial by jury, now generally restricted to an inquiry held by the coroner (*q.v.*) into the cause of death in certain circumstances, in respect of treasure trove, and, in the city of London, into the origin of fires causing loss or injury. New rules which came into force in 1953

bound coroners (1) to admit the public to any inquest unless national security might be affected; (2) to inquire solely into the identity and manner of death of the dead person; and as to the persons (if any) to be charged when the death was by murder, manslaughter, or infanticide. Any person held by the coroner to be a properly interested person is entitled to examine any witness either personally or through a lawyer. Written evidence on the cause of death is not admitted unless there is a good reason for the non-attendance of the writer.

A coroner's inquest, though it may terminate in the committal of a person for murder or manslaughter, is not a trial, and the laws of evidence which hold good in other courts are not insisted upon in the coroner's court. Hearsay evidence is admissible. The coroner must hold an inquest with a jury of 7 to 11 persons where there is reason to suspect that death was due to murder, manslaughter, or infanticide, or took place in prison. The coroner must view the body but the jury need not do so unless the coroner or a majority of the jury so decides.

Witnesses are examined on oath. A person suspected of having caused the death may attend and give evidence, or he may reserve his evidence. Witnesses are questioned directly by the coroner. A medical man who has made a post-mortem examination of the body by order of the coroner may be among the witnesses.

At the conclusion of the evidence the coroner sums up the case if there is a jury, and the jury, who may retire if they wish, then arrive at a verdict. The jury is also entitled to make comments on the case, which are termed *riders*.

Inquisition or **HOLY OFFICE, THE** (Lat. *inquisitio*, inquiry). Tribunal of the Roman Catholic Church for the suppression of heresy. Originating in 1248, it became a terrifying instrument of oppression in Spain in 1478 and in the Netherlands in 1567. It was superseded 1823 by a tribunal of faith concerned with repressing heretical literature.

Heresy was a serious offence against the state in the time of the ancient religions; it was so regarded by Constantine and his successors when Christianity was adopted by the Roman Empire. Theodosius regarded it as a capital offence. By various councils bishops were enjoined to extirpate it. The spread of such bodies as

the Cathari, Waldenses, and Albigenses led the Church to take more active steps. Innocent III in 1215 sent special delegates, including Dominic, to Languedoc and other parts of southern France to inquire and report to Rome. In 1216 Dominic founded his order to repress heresy; its members, who were supplemented by a force called Christ's Militia, became known as *Domini canes*, hounds of the Lord. The Inquisition proper was founded 1248 by Innocent IV. Dominicans then and after were entrusted with its chief direction. The institution of the Congregation of Cardinals of the Holy Inquisition at Rome in 1542 by Paul III, remodelled by Sixtus V, was prompted by what the papal authorities regarded as the dangerous spread of Lutheranism.

The first tribunal of the Inquisition was set up at Toulouse. The system gradually extended to Italy, except Naples; to Spain, Portugal, Peru, Mexico, Goa, the Netherlands, and Germany. The first inquisitor-general to condemn heretics to the stake was a Dominican, Pietro de Verona, who was slain by the populace at Como in 1252, and later canonised as Peter Martyr; he was one of several who met a similar fate. Procedure and punishments varied in degree in different countries, but were specially severe in Spain, where for political and other reasons the Inquisition was reorganized by the State, with the permission of Sixtus IV, in 1478, and directed against the Jews and Moors, who were suspected of treasonable plots. Torquemada was inquisitor-general 1483-98; Diego Deza, 1499-1506; and Ximenes, 1507-17. The statement of Llorente, secretary of the tribunal at Madrid, 1790-92, that more than 340,000 persons were executed is disputed by other authorities, but the number, exclusive of those otherwise dealt with, was undoubtedly large and the tortures inflicted were terrible.

Methods of Procedure

The Spanish Inquisition was directed against words and actions, thoughts and assumed intentions. The accused, if he disobeyed the summons of the tribunal, was seized. One informer was enough to secure this. He might be accused of heresy, of favouring heretics, of hindering the Holy Office, of withholding information regarding heretics, of blasphemy, sorcery, witchcraft, Judaism, infidelity, polygamy, seduction, etc. He was not allowed to know the name of

his accuser or even, at first, the charge against him. He was kept in durance at the pleasure of his judges. He was plied with questions and induced by artifice to incriminate himself or others. If recalcitrant he was subjected to torture by rack, pulley, fire, water, or the swinging knife. If burnt, his effigy was burnt also. Confiscation of property, banishment, the galleys, and imprisonment for life were minor penalties.

The tribunal sat in secret. Its sentences were proclaimed at what was called an auto-da-fé and carried out by the civil authorities. Torture was introduced in the 13th century. Details of the procedure are given in a manual by Nicolaus Elymeric (d. 1399), pubd. in 1587, reprinted 1762. The Spanish In-

quisition was overthrown by Napoleon in 1808, formally abolished 1813, revived 1814, abolished again 1820, superseded 1823 by an independent Tribunal of the Faith, and finally disappeared 1834-35.

The Inquisition existed in Portugal 1557-1826; was suppressed in Germany at the Reformation; in France in 1598; in Italy in 1870. See Albigenses; Alva; Auto-da-Fé; Dominicans; Heresy; Torquemada.

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INSANITY: A CONCEPT IN LAW

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Once generally used as a term covering any mental illness, the word insanity has come to have, strictly speaking, a legal significance only. Here is an explanation of its meaning in the legal sense. See also Mental Disorder; Psycho-analysis; Psychology, and allied subjects

Insanity, in the past, has been used loosely as a term to include all the more serious forms of mental disability. It has never been possible, however, for any precise definition of the term to be applied, and with the increasing knowledge and understanding of the nature of mental illness it is now considered that the medical use of the word insanity is unsatisfactory. As a substitute, the expression mental disorder is in current use to include all degrees of mental ill-health. Insanity, therefore, should not be used except in the restricted sense of legal unsoundness of mind. This means that it is only technically correct to speak of a person as being insane when either he has been or he could be certified as "a person of unsound mind."

It is of importance to note that, in the wording of the statutory form, in order to be certifiable under the Lunacy Act a person must be not only "of unsound mind," but also "a proper person to be taken charge of and detained under care and treatment." This indicates to some extent the legal view of the degree of unsoundness of mind which constitutes insanity.

Reasons for certification of a person of unsound mind were summarised by Sir Claude Schuster some years ago thus: (1) to protect the public from injury; (2) to protect the patient from self-injury; (3) to give treatment with a view to cure or amelioration

which cannot otherwise be given; (4) to protect the patient from injury due to want of care.

Those suffering from mental illness can be placed under care, treatment, and control under the provisions of the Lunacy Act, 1890, and Mental Treatment Act, 1930. The methods to be used for those who are willing to receive treatment (voluntary patients) and for those who are incapable of expressing willingness or unwillingness regarding treatment (temporary patients) are detailed in the article Mental Disorder. A person who is unwilling to submit himself for treatment, but is considered to be of unsound mind and "a proper person to be taken charge of and detained" will be dealt with under an order and certified. The usual method for a private patient is by reception order or petition. Five separate documents are required:

(1) The petition, signed if possible by the nearest relative.

(2) Statement of particulars, giving details of name, age, sex, length of illness, occupation, etc.

(3 and 4) Two medical certificates, one written, whenever possible, by the usual medical attendant of the patient. The certifying practitioners must examine the patient separately and each within seven clear days of the date of the presentation of the petition. They must not be related to the petitioner, must not be in partnership together, and must have no financial or proprietary interest in connexion with the patient's treatment and care under detention.

(5) Reception order: this is signed by the judicial authority (county court judge, stipendiary magistrate, or specially appointed justice of the peace) if he is satisfied, after studying the other documents, that the person should be detained. The order authorises the reception of the patient in the mental hospital or home named in the documents. The justice need not himself see the patient; but if he does not it is the duty of the person in charge of the hospital to acquaint the patient of his right to be visited by a justice.

Where a patient's relatives are unable to pay private fees, a summary reception order is used. The documents required are:

- (1) Statement of particulars.
- (2) One medical certificate.
- (3) Reception order, signed by a J.P. The medical attendant, on forming the opinion that a patient is now showing symptoms of unsoundness of mind and is in need of care and treatment, can notify the local relieving officer who will arrange either for the attendance of a medical practitioner and justice at the patient's home or for transport to convey the patient to an observation ward on an order which holds good for three days.

Where there is need for action with the least possible delay, *e.g.* in exceptional cases of dangerous violence, an urgency order may be used. This requires (1) statement of particulars, (2) medical certificate, and (3) order—signed by nearest available relative who has seen the patient within two days. The order remains in force only seven days, and before the expiration of this period the patient must be either discharged or, if detained, dealt with in some other statutory manner.

The question of responsibility for crime when a defence of insanity is raised continues to exercise the minds of medico-legal experts. In order to establish such a defence it must be clearly proved that "at the time of committing the act the party accused was labouring under such defect of reason from disease of the mind as not to know the nature and quality of the act he was doing or, if he did know it, that he did not know he was doing what was wrong." This quotation is from the *McNaghten* rules (*q.v.*).

The Homicide Act, 1957, introduced into English law the doctrine of diminished responsibility (already established in the common law of Scotland) under which a person may be convicted of manslaughter instead of murder if at the time of the crime, he was, although not insane, yet suffering

from an abnormality of mind such as substantially to impair his responsibility for his acts.

If at the beginning of a trial a person is found to be insane, he is said to be unfit to plead and will not be tried. If an accused person during the course of his trial is found to have committed the offence and to have been insane at the time, the jury will return a verdict of "Guilty, but insane." The judge will then make an order for detention "until Her Majesty's pleasure shall become known," which implies that he is detained in custody at Broadmoor.

Marriage is a contract and therefore when one of the parties to a marriage is at the time of the ceremony incapable, because of unsoundness of mind, of understanding the nature of the contract he is entering into, the marriage is void. When one of the parties, although of unsound mind to some degree, is nevertheless capable of understanding the contract, then the marriage is not automatically void but is voidable, that is, a decree of nullity may in certain circumstances be obtained. This is the result of the Matrimonial Causes Act, 1950, which provides that a decree of nullity may be granted if "either party to the marriage was at the time of the marriage of unsound mind or a mental defective or subject to recurrent fits of insanity or epilepsy." But the court must be satisfied that the petitioner was in ignorance of the state of mind of the spouse at the time of the marriage; that the proceedings were instituted within a year of the marriage; and that marital relations with the consent of the petitioner have not taken place since the petitioner was aware of the grounds for a decree.

Under an act of 1937 a petition for divorce could for the first time be presented on the ground that the respondent is "incurably of unsound mind and has been continuously under care and treatment for a period of at least five years immediately preceding the presentation of the petition." "Care and treatment" is held to mean that the patient is under some form of statutory order of the Lunacy or Mental Treatment Acts, or that he has remained under treatment as a voluntary patient without interruption following a period under such order.

A person of unsound mind may nevertheless, subject to certain conditions, make a valid will. The conditions are that (1) he must

understand the nature of a will; (2) he must understand the effect of a will; (3) he must have reasonable knowledge of the nature and extent of his estate; (4) he must have capacity to appreciate which dependents, relatives, or friends may have reasonable claims upon his bounty; (5) he must not be under any influence, delusion, or suspicion which would cause him to omit any person or persons as beneficiaries who otherwise might reasonably have been included; (6) he must not be under any influence, delusion, or suspicion which would cause him to make any unreasonable gift.

It had been held that the *McNaghten* rules do not apply to civil liability for damages for an act done by an insane person. Thus a person is liable to damages for a tortious act done by him—*e.g.* assault—if he knew the nature and quality of his act even though he did not know that what he was doing was wrong.

In cases of suicide it is usual for the coroner to return a verdict including the words "whilst the balance of his mind was disturbed" whenever there is evidence indicating a degree of unsoundness of mind.

Inscribed Stock. Form of stock for which no certificates are issued. The names of the holders are inscribed in a register kept at either the Bank of England or some other bank, or at the offices of the crown agents for the colonies. Inscribed stock cannot, like other stocks, be transferred by signing a deed. The holder, or his attorney, must attend at the bank and sign the register if he wishes to sell.

Inscriptions (Lat. *in* upon; *scribere*, to write). Records composed of alphabetic or other conventional characters written, incised, or impressed upon durable materials. They occur upon rock-surfaces and upon stone, metal, wood, and other substances, including buildings, monuments, coins, gems, ornaments, seals, pottery, and weapons. Their study is called epigraphy.

The invention of writing seems to have followed closely upon the development of metal tools suitable for stonecutting, and in a country like Egypt where fine stone abounded it became a favourite medium for writing. Large slabs of stone or stelae, obelisks, the plinths of statues, and the walls of temples and tombs provided a durable medium for permanent record. The autobiographies of noblemen and the

annalistic inscriptions of the Pharaohs are the main sources of knowledge of the social and political history of ancient Egypt, while theological texts and scenes record their beliefs and cult practices.

Assyrian and Babylonian inscriptions are found for the most part on slabs, often illustrated with relief sculptures, from the kings' palaces rather than the gods' temples. Persian inscriptions, less numerous, are also found in the great palaces of the Achaemenid period, though the best-known is the trilingual inscription at Behistun (*q.v.*) set by Darius the Great on the rocks above the Ecbatana road.

A few short early Canaanite inscriptions found in Palestine and Sinai are thought by some to be the precursors of the Phoenician alphabetic script (*see* Alphabet). Israelite inscriptions are rare; the Moabite stone (*q.v.*) and the Siloam tunnel text throw contemporary light on Biblical history. Byblos in Phoenicia, the home of the western alphabet, has yielded inscriptions in various scripts dated from c. 1500 to 950 B.C., and relics of Phoenician enterprise, scattered over the Mediterranean region, include a 10th-century inscribed bronze bowl found in Cyprus, and a later tariff of sacrifices in Marscilles. Punic inscriptions are frequent in N. Africa. Of some ancient languages, such as Lycian, Phrygian, and Etruscan, modern knowledge comes almost wholly from monumental remains. South Arabian inscriptions, in several scripts, occur from the 7th century B.C. onwards, most of them being dedicatory on altars, tombstones, and stelae.

The Greeks used to set up inscriptions in their temples recording important events like treaties and laws. At Ankara is a famous marble, recording in Greek and Latin the life work of Augustus. The oldest Latin writing occurs upon a gold fibula from a 6th century tomb at Praeneste, the oldest stone inscription on a 5th century pillar found near the Roman Forum. After the fall of the western empire a by-path of epigraphy is furnished by the runic inscriptions of Scandinavia and post-Roman Britain.

The earliest Chinese inscriptions are found on Shang dynasty bronzes and Chou dynasty stone drums. In 781 a tablet was set up at Hsian to describe the Nestorian faith; in 837 the Five Classics

were inscribed upon tablets still preserved there. In Mongolia 8th century inscriptions in Chinese and old Turkic in the Orkhon valley are important as precursors of later scripts. In the 3rd century B.C. Asoka inscribed upon rocks and monoliths scattered over India edicts proclaiming the ethical ideals of Buddhism. Near Mandalay a pagoda is surrounded by 733 others, each enshrining an inscribed marble slab, the whole forming the complete Burmese text of the Buddhist scriptures.

The full decipherment of the Maya and Aztec inscriptions of

pre-Columbian America still awaits accomplishment. Stone bas-reliefs in Central America have yielded a series of glyphs, mostly denoting the divisions of the calendar. Their pictographic origin is undoubted, but their relationship to phonetic writing lacks definite proof. *See* Alphabet; Cuneiform; Graffiti; Hieroglyphs; Ogam; Rune; Writing.

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INSECT: LARGEST CLASS OF ANIMAL

A. D. Imms, D.Sc., F.R.S., Author of *Insect Natural History*, etc.

This general article is supplemented by full entries on the better known insects, e.g. Ant; Bee; Beetle; Butterfly; Fly; Moth; Wasp, etc. See also Arthropoda; and articles on the orders, Aptera; Diptera; Hemiptera; Lepidoptera, etc.

Insects (Lat. *insectum*, cut into) form the largest class in the animal kingdom and belong to the phylum Arthropoda, or jointed-limbed animals. In this same phylum are included crabs, lobsters, scorpions, centipedes, spiders, etc.

About one million different species of insects have been described and named, yet new kinds are constantly being found in tropical and other little explored regions. While more than 20,000 species are known from the British Isles, new kinds are still brought to light from time to time.

The name insect is in allusion to the manner in which the body is made up of ring-like pieces or segments. The head bears a pair of feelers or antennae, and the thorax carries three pairs of legs and usually wings. A metamorphosis is usually undergone.

The vast majority of insects are of small or medium size. Very minute forms or relatively gigantic kinds have to face certain disadvantages and, perhaps for this reason, are not very common. Among the smallest forms are certain beetles that are no more than 0.007 in. long; some of the fairy flies are only slightly larger. The largest insects include certain moths with a wing-expanse of 11 in. The African Goliath beetle has massive proportions, being 4 in. long with a breadth of 2 in. Among British insects the largest include the death's head moth, which measures 5½ in. across its wings, and the silver water-beetle with a length of 1½ in. and up to ¾ in. broad.

STRUCTURE. The cuticle of an insect is the hardened skin which

forms the skeleton of the creature. It is external, and not internal as in a vertebrate animal, and encloses the body like a cylinder. Its main constituent is chitin, and it has the property of resisting decay: that is why collections of insects remain in a life-like state for several centuries if looked after. The external skeleton not only gives attachment to the muscles, but also guards the animal against water-loss—a difficulty which all land animals have to face. The skeleton is almost impermeable to water.

The head of an insect is its sensory and feeding centre. It bears the antennae, eyes, and mouth-parts. The antennae are varied in form and often very different in the two sexes. They are the chief seat of the organs of touch and of smell. The eyes are of two kinds—compound or faceted eyes and simple eyes or ocelli. Compound eyes are situated on either side of the head and are formed of usually numerous lenses or facets of hexagonal form, each with separate underlying visual elements. The ocelli are commonly three, arranged in a triangle, above or between the bases of the antennae. The mouth-parts comprise three separate pairs of jaws, situated one behind the other. They are the mandibles, followed by a pair of maxillae, and the hindmost pair are joined together forming a lower lip or labium. In many insects, *e.g.* cockroaches, dragonflies, beetles, the mouth-parts are used for biting and chewing; in others, *e.g.* butterflies and moths, they are modified into a sucking tube; while in

still others, e.g. plant-bugs, mosquitoes, horse-flies, fleas, they are adapted for piercing.

The thorax is the locomotory centre of an insect and is formed of three divisions or segments, each bearing a pair of legs. In most insects the second and third of these segments also carry each a pair of wings, except in flies, where it is the middle segment only which bears organs of flight.

The wings are membranous expansions of the wall of the thorax. They are usually supported by a tubular framework of longitudinal ribs or veins, often joined by connecting struts or cross-veins. Some of the most primitive insects, e.g. the silver fish of our kitchens and bakeries, are without wings, and there is no evidence that they ever possessed these organs. The females of certain moths and flies have the wings reduced to mere flaps or have lost them entirely—a peculiarity that is believed to have occurred also in lice and fleas.

The abdomen is the region where digestion and excretion take place and also the sexual functions. At its apex it often bears a pair of tail-feelers or cerci, which are very long in mayflies and short in grasshoppers. In the female the abdomen is often provided with an egg-laying instrument or ovipositor. Long and needle-like in ichneumon flies, it is broad and blade-like in long-horned grasshoppers. Amongst ants, bees, and wasps it is no longer used for egg-laying and has become converted into a sting.

Along the sides of the thorax and abdomen in most insects there are minute breathing pores, or spiracles, which lead into an internal network of breathing tubes called tracheae.

GROWTH AND METAMORPHOSIS. Growth in an insect takes place in cycles interrupted by periods of moulting. Because the cuticle is hard and inelastic, it does not allow of any growth in size or change of form. This difficulty is overcome by moulting the old cuticle and growing a new one in its place. Since the new cuticle is, at first, soft and pliable it adapts itself to changes in size and form. The caterpillars of butterflies and moths moult six to nine times; fly-maggots cast their skins only three times, the common cockroach moults seven times, while the nymphs of mayflies and stoneflies may cast their skins as many as 30 or 40 times in a life of nearly two years.

Once an insect becomes adult, all growth ceases, and it no longer moults. Small flies, for example, do not grow up into larger kinds—they belong to different species. Where growth involves evident changes of form such a change is termed metamorphosis. The lower forms of insect life, such as the springtails and the silver fish, change their form so little during growth that no metamorphosis takes place. Most of the lower insects, however, pass through direct or incomplete metamorphosis. This happens in cockroaches, earwigs, grasshoppers, plant-bugs, etc., and the young are very like their parents except for the absence of fully-grown wings. Such immature forms are known as nymphs. Mayflies and dragon flies all have aquatic nymphs that breathe mostly by gills and live in ponds or streams.

In the higher insects an indirect or complete metamorphosis takes place. This happens in butterflies and moths, beetles, flies, ants, bees, and wasps. The young are termed larvae and are so different from their parents that it seems incredible that the one grows into the other. When growth has been completed as larvae, the creatures change into a resting phase or pupa which, in butterflies, is known as a chrysalis.

It is during the pupal stage that the larval organs are completely disintegrated and new or adult organs are built up in their place. Thus the sluggish, leaf-eating caterpillar becomes the active nectar-feeding butterfly or moth; the degenerate, legless grub of a wasp or bee becomes changed into the winged insect.

The adult insect is the imago: it is essentially for reproduction. After mating and egg-laying, the female insect usually dies.

The total life from the egg onwards rarely exceeds a year, and is often much shorter. Sometimes, however, two or more years are spent as a nymph or a larva, though it is rarely that adults live so long. The queen bee is an exception and is capable of living about seven years, while the queens of some ants live even longer.

SENSES AND BEHAVIOUR. Insects respond to touch or contact, light, smell, taste, and sound. It is probable that they do not feel, see, smell, taste, or hear in the same way as man, as their sense-organs are very different. Touch is experienced by means of innervated hairs that are especially

numerous on the antennae. The organs of smell are also chiefly located on those same appendages. Taste organs lie on the mouth-parts and in the mouth-cavity. Hearing is by means of a sensitive drum-like membrane on either side near where the thorax and abdomen join, as in many moths and grasshoppers. In other grasshoppers these drums, or tympana, lie on each fore-leg near the "knee joint."

No insect has a true voice: the most usual way of making sounds is by stridulation, i.e. the rubbing of one part against another, as in grasshoppers and crickets. The sounds they make are a means of bringing together the members of the two sexes of a species, and the faculty of sound production is often present only in the male.

The compound eyes are specially sensitive to movements of objects and, since they have no focusing mechanism, their image-forming capacity is very limited. Insects have a sense of colour vision, and they are especially sensitive to the shorter light waves, including ultra-violet. They are mostly rather insensitive to red.

CLASSIFICATION. Insects are grouped into 24 major divisions or orders. The most important of these are:

Orthoptera (Gr. *orthos*, straight; *pteron*, wing): cockroaches, grasshoppers, crickets.

Odonata (Gr. *odous*, gen. *odontos*, tooth): Dragon flies.

Neuroptera (Gr. *neuron*, nerve; *pteron*, wing): lacewings and their allies.

Hemiptera (Gr. *hemi*, half; *pteron*, wing): plant-bugs, aphids, and the like.

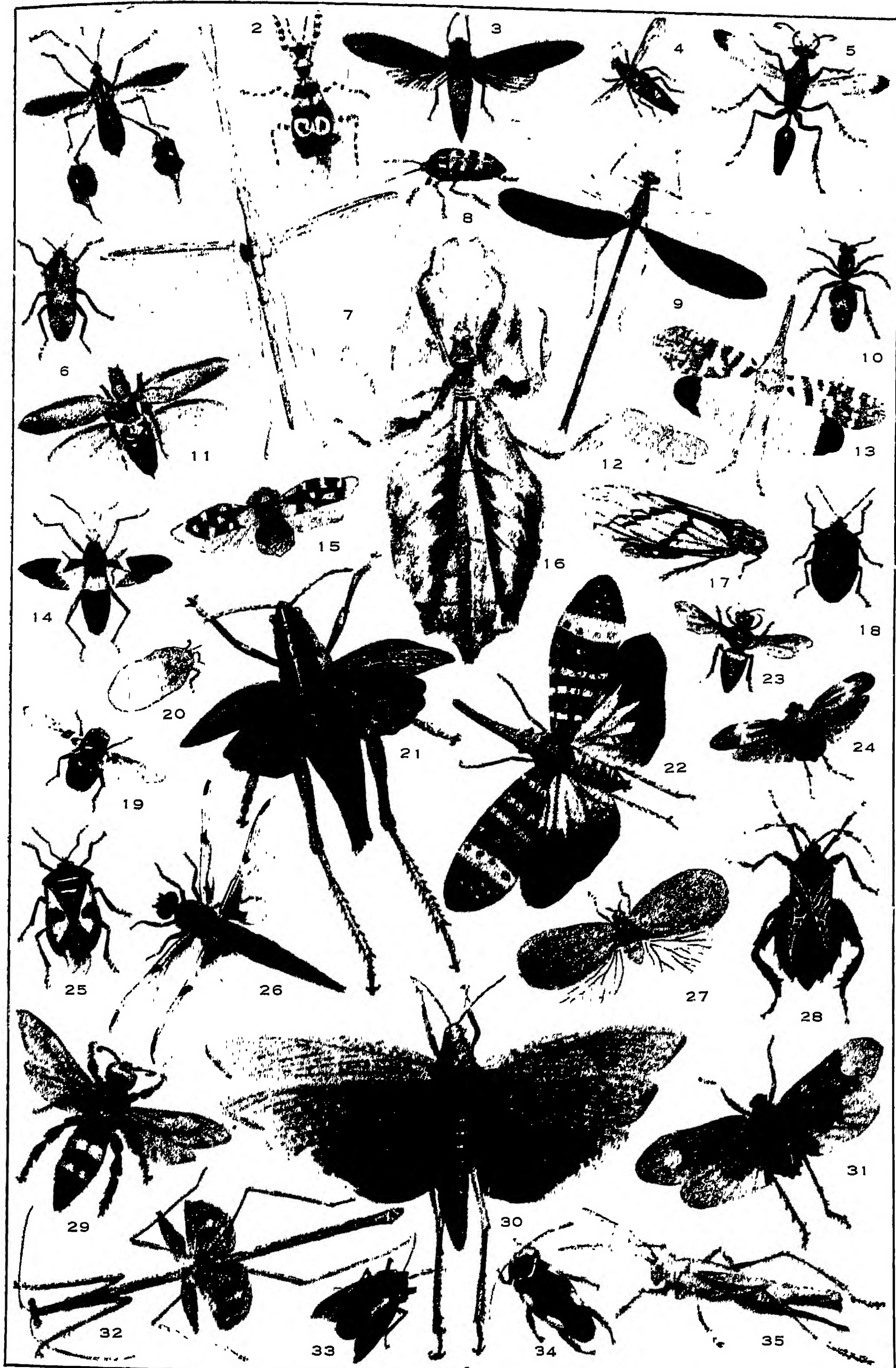
Lepidoptera (Gr. *lepis*, gen. *lepidos*, scale; *pteron*, a wing): butterflies and moths.

Coleoptera (Gr. *koleos*, sheath; *pteron*, wing): beetles.

Hymenoptera (Gr. *hymen*, membrane; *pteron*, wing): ants, bees, wasps, ichneumon flies, etc.

Diptera (Gr. *di*, two; *pteron*, wing): true flies.

ECONOMIC IMPORTANCE. Insects play a most important part in the economy of nature. They are found everywhere, and some species or other inhabit almost every kind of environment. Many species are injurious to human welfare. Such kinds either destroy or injure crops, fruits, stored products, timber, woollen goods, etc.; other kinds attack domestic animals; and a number of species directly affect man's own person.



1. *Diactor bilineatus*, S. America. 2. *Pseudocercobotra ocellata*, W. Africa. 3. *Huechys sanguinea*, China. 4. *Stilbum anethystinum*, Africa. 5. *Chlorion lobatum*, E. Indies. 6. *Cantao parenthum*, India. 7. *Marmessoidea quadriguttata*, Singapore. 8. *Libyssa signata*, N. Africa. 9. *Neurobasis*, Sumatra. 10. *Mutilla occidentalis*, N. America. 11. *Metallurgus splendidus*, Borneo. 12. *Achilus flammeus*, Australia. 13. *Fulgora candelaria*, China. 14. *Paryphes flavocinctus*, Central America. 15. *Cercopis dorsivittata*, India. 16. *Pulchriphylum scythe*, India. 17. *Geana sulphurea*, India. 18. *Tectocoris banksii*, Australia. 19. *Rutilla splendida*, Australia. 20. *Ityræa electa*, E. Africa. 21. *Rhomalea*, S. America. 22. *Fulgora carenia*, Burma. 23. *Chrysantheda dentata*, Brazil. 24. *Tomaspis furcata*, Brazil. 25. *Catacanthus nigripes*, Celebes. 26. *Libellula quadrimaculata*, Britain. 27. *Phromnia rubra*, Madagascar. 28. *Pachylis pharaonis*, Amazons. 29. *Triscolia flavifrons*, S. Europe. 30. *Phymateus viridipes*, E. Africa. 31. *Scamandra arcuigera*, Celebes. 32. *Thespis purpurascens*, S. America. 33. A Pentatomid, Australia. 34. *Gyna gloriosa*, W. Africa. 35. *Locusta viridis*, Britain. Drawings about half life-size.

INSECT · BRIGHTLY COLOURED SPECIMENS FROM MANY GROUPS



1. The egg. 2. Caterpillar at birth. 3. Full grown caterpillar. 4. Caterpillar hanging to a twig by its hind legs just before changing into a chrysalis. 5. Chrysalis beginning to emerge from its skin. 6. Chrysalis withdrawing from old skin. 7. Chrysalis. 8. Butterfly (*Danaus archippus*) breaking the

chrysalis skin. 9. Butterfly freeing itself from chrysalis and expanding its wings. 10. Butterfly with wings drying after expansion. 11. The butterfly. The drawings are all life-size, except in the cases of 1 and 2, where the actual sizes are indicated by scale lines.

INSECT: BIRTH AND EVOLUTION OF A BUTTERFLY

These last include mosquitoes, fleas, lice, and midges, and are for the most part active blood-suckers; it is through this propensity that the organisms of certain virulent diseases are transmitted from man to man. In this way malaria is carried by the *Anopheles* mosquitoes, while other mosquitoes transmit the virus of yellow fever. The tsetse fly of tropical Africa is the carrier of the pathogenic organisms of sleeping sickness; the body louse transmits typhus; and certain fleas are carriers of the bacillus of bubonic plague.

Not all insects are injurious to man. The hive-bee, for instance, produces honey and beeswax; the silkworm yields silk and gut; the lac insect produces shellac and the beetle called the Spanish fly provides the drug cantharidin. Other insects are useful in that they prey upon and destroy noxious species. Many other kinds, and their larvae, are scavengers, while bees, moths, butterflies, and certain flies play an all-important part in the pollination of fruit-trees and other flowering plants.

Methods of controlling noxious insects may be grouped under three main categories: (1) chemical methods (*see* Insecticide); (2) cultural methods; (3) biological methods. Cultural control involves adapting methods of cultivation of crops so as to render them as unfavourable as possible to insect pests. The eradication of charlock and other weeds destroys the wild host of certain pests of cruciferous crops; an important method of protection against the frit-fly of oats is to sow as early as possible in the spring; and so on. Biological control involves the use or encouragement of other organisms in the repression of pests. Insectivorous birds and mammals should never be destroyed. Also, many insects, such as ichneumon flies, ladybirds and their larvae, and chalcid wasps, are important natural agencies in the control of noxious insects. Successful results have sometimes followed the transfer and colonisation of beneficial insects in countries where they did not previously exist.

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Fruits and Hops, A. M. Massee, 1937; Instructions for Collectors, No. 4a, Insects, J. Smart (British Museum), 1940; General Textbook of Entomology, A. D. Imms, 1942.

Insecticide. Substance designed to kill harmful insects; also other pests such as red spider, slugs, and snails. Insecticides are used very extensively in most parts of the world, especially on growing crops. In modern conditions of agriculture, large numbers of a particular variety of fruit, flower, or vegetable are planted together, so that any trouble which occurs spreads rapidly and needs correspondingly rapid counteraction. Also rising standards of hygiene and public health encourage continuous research to discover improved insecticides. Before the 20th century, insecticides were used only to a very limited degree. Nicotine was probably first used in the 18th century; derris was a late 19th century discovery.

Insecticides are usually divided into two main groups: (1) Contact insecticides, including derris, nicotine, and pyrethrum, all of vegetable origin; these destroy insects such as aphids (green and black fly), capsids, thrips, lice, and ticks, which suck the sap from plant tissues or the blood from mammals. As their mouth parts remain embedded in the tissues of the host, they can be killed only on touch. (2) Stomach poisons, chiefly lead and zinc arsenates and sodium fluoride, all highly poisonous; these kill biting and chewing insects such as caterpillars and the larvae of various beetles. They are sprayed over the foliage or other part of the plant on which the insects feed, preferably as a preventive measure.

Certain insecticides, notably B.H.C. and D.D.T. among the synthetic compounds, act as both stomach poisons and contact agents. They are more persistent, owing to their chemical stability, and relatively less expensive than *e.g.* derris and pyrethrum.

Insecticides are available in various forms, *e.g.* dusts, sprays, aerosols, smokes, choice depending on the type of pest and climatic and other conditions. Method of application varies considerably. Sheep are completely immersed in baths of water containing gamma B.H.C. or some other type of dip. Flies, wasps, and other winged insects on industrial and domestic premises can be attacked with an automatic low pressure dispenser, worked by pressing a button. Plants in small gardens can be pro-

tected by the use of hand syringes or double action hand sprayers; special low volume sprayers using only 10 to 15 gallons of water per acre can be used in agriculture. The application of small amounts of active insecticide dusts without the addition of considerable quantities of inert carrier is not yet possible. Dust blowers are useful for light dusts, but there is always extensive drift to adjoining crops.

Correct timing and application are very important. Spraying or dusting is necessary at the first sign of trouble, and should be repeated if infestation persists. The insecticide should always be applied at the strengths recommended by the maker since higher rates may be dangerous, lower rates ineffective. Certain pests, notably aphids, red spider, and thrips, often congregate on the under-sides of plant foliage—hence the need to cover adequately both sides of the leaves.

Useful insecticides include:

Azobenzene: a compound toxic to red spider eggs, generally applied by means of a smoke generator, an exceptionally efficient method under glass: the wick is ignited, and produces a smoke cloud that penetrates to every part of the glasshouse. Smoke generators based on B.H.C., D.D.T., and parathion are also available.

B.H.C. (benzene hexachloride). B.H.C. was first prepared in 1825 by Michael Faraday, who allowed benzene and chlorine to react together in sunlight. British scientists discovered its remarkable insecticidal properties in 1942, when searching for an alternative to derris for the control of flea beetle. Of the four known isomers of B.H.C., the gamma isomer was found the most toxic to insect pests. Products based on mixed isomers are liable to taint certain crops, notably potatoes and black currants; gamma B.H.C. formulations have been found least liable to taint crops.

B.H.C. controls a very wide range of pests of growing crops, some of which it was previously impossible to destroy effectively—*e.g.* wireworm. Combined with an organo-mercurial, it provides a dual-purpose seed dressing to protect cereals or sugar beet from both wireworm and fungus diseases. Cabbage root fly, onion fly, thrips, leaf miners, aphids (including woolly aphid or American blight), also apple and plum sawflies are susceptible. B.H.C. can be used as a spring spray for fruit trees,

eliminating the need for winter washing. It has proved highly successful against various locust species, termites, sugar cane frog-hopper, white grubs, and cotton jassid in the Sudan. It is effective against pests of stored cereal products such as grain weevil and flour moths, also ants, cockroaches, crickets, flies, mosquitoes, and clothes moths. It is superseding arsenic as the basis for sheep dips, and calomel dust (mercurous chloride) for cabbage root fly and onion fly; and is toxic to arsenic-resistant ticks.

D.D.T.: valuable where good foliage persistence is required, e.g. for carrot fly and pea moth. Less effective against aphids (except pea aphid) than B.H.C.; slower acting than B.H.C. but more persistent. (For the use of D.D.T. to control insects carrying human diseases, see Dichloro-Diphenyl-Trichloroethane.)

Derris: an extract from the roots of a tropical climber, non-poisonous to man, but toxic to fish. Kills sucking insects and young caterpillars, remaining unequalled for control of the raspberry beetle.

D.N.C. (dinitro-ortho-cresol): a winter spray for fruit trees, best applied just before the buds burst. Controls aphids, red spider, capsid; reduces caterpillar infestation.

Lead arsenate: valuable against caterpillars and codling moth; highly poisonous.

Lime-sulphur: the standard remedy for currant "big bud"; excellent for apple and pear scab.

Nicotine: a quick-acting, contact insecticide demanding a rising temperature of 60° F. for best results. Kills aphids, caterpillars, leaf miners, and thrips. Has no residual effects.

Parathion: an organic phosphorus compound highly poisonous to warm-blooded animals, including man. Extremely toxic to aphids and red spider. In Great Britain it is used chiefly against red spider, and chrysanthemum and tomato eelworm.

Pyrethrum: a quick-acting, non-poisonous insecticide which lacks persistency. Used chiefly as an ingredient in fly sprays. Combinations of piperonyl butoxide and pyrethrins (the active principle of pyrethrum) are used to make insecticides providing better and less costly protection than pyrethrum against pests of food-stuffs.

Systemic insecticides: these are based on organic phosphorus compounds and are absorbed by the

plant into the sap stream. It is claimed that they are effective for several weeks, and that beneficial insects are not destroyed. Recommended for aphids and red spider on hops and sugar beet.

Tar-oil washes: winter sprays for fruit trees applied only during the dormant period. Control aphids and sucker and mitigate caterpillar attack. Also useful for cleaning up trees infested with moss and lichen.

AGAINST DOMESTIC PESTS. A D.D.T. dust or a gamma B.H.C. powder sprinkled lightly over clothes and under carpets destroys clothes moths and carpet beetles. A D.D.T. dust on mattresses and floors, and behind wallpaper and picture rails, will control bed bugs. D.D.T. sprayed into the joints and any openings in furniture kills furniture beetles. D.D.T. in powder or as a spray applied to cracks and crevices, particularly near a source of dampness, e.g. the sink, will control silver fish (*Lepisma saccharina*).

Insectivora (Lat., insect eaters). Name for the zoological order of primitive mammals. Most of them are small, and nocturnal and terrestrial in habit. The hedgehog, mole, and shrew are familiar British examples. The body is generally covered with soft fur, though the hedgehog has spines, and the animals walk in plantigrade fashion by placing the sole of the foot on the ground. The molar teeth have small conical tubercles on the crowns, and there are always at least two pairs of lower incisors. The brain is of low type and small size, the skull being low and the facial region prolonged. These animals do not feed exclusively on insects. Moles eat worms; some of the arboreal species eat leaves as well as insects; and the amphibious Potamogale catches and eats fish.

Insectivorous Plants. Plants of several genera and families which have adapted parts of their structure to the catching of insects, whose soft parts are dissolved out and then absorbed by the plant for its nourishment. Various observers had noted the presence of dead insects on these plants, and one species, Venus's fly-trap (*v.v.*), had long been cultivated

in greenhouses on account of the curious sensibility shown by its gin-shaped leaves; but until the publication of the researches of Darwin, 1875, chiefly upon the sundews, the true nature of these plants was not realized. Sundew (*Drosera*), butterwort (*Pinguicula*), bladderwort (*Utricularia*), and a few others procure at least the greater part of their sustenance by digesting and assimilating trapped insects. See Bladderwort; Bog Plants; Butterwort; Indian Cup.

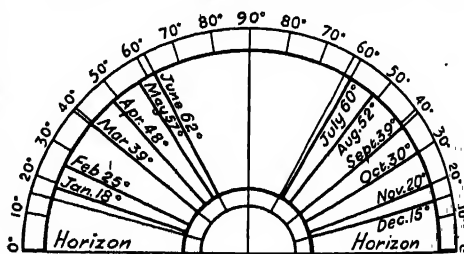
Inselberg (Ger., island mountain). Isolated rock hill standing above a flat plain, in regions of desert or semi-arid climate. They represent residual rock masses not worn away by the agents of erosion which levelled the surfaces on which they stand. They have often a distinctive dome or beehive shape, and are well-known features in parts of E. and S.W. Africa, Nigeria, Arabia, and W. Australia.

Insemination. A note on the use of Artificial Insemination is given under that heading. See also Reproduction.

Inshan. Mountain range forming part of the system which extends across the centre of China from the Hindu Kush to the Sea of Okhotsk. The Inshan Mts., which run S. of the Gobi Desert, are a western continuation of the Khyngan Range. To the S., beyond the Hwang-ho, is the desert plateau of Ordos. Height, 10,000 ft.

Insolation (Lat., *insolare*, to place in the sun). Portion of the sun's radiant energy received by the earth. The quantity received per day at a given place depends upon the angular height of the sun on that day, the transparency of the atmosphere, the distance between the earth and the sun, and the quantity of solar energy emitted on that day.

The intensity of radiation in the beam in free space at the mean distance of the earth from the sun is known as the solar constant and is equal to 135 kilowatts per sq. decametre of cross section. If the



Insolation. Aspect diagram depicting seasonal angle of sun altitude over London
By courtesy of "Specification"

atmosphere neither reflected nor absorbed solar radiation, the icy polar wastes would receive more insolation on a midsummer day than would the hottest regions of the earth in any 24 hours. Transparency of the atmosphere varies greatly, the passage of the sun's rays being impeded by water vapour, dust, and smoke particles; under the most favourable conditions only about three-quarters of the solar energy is transmitted. In high latitudes where the rays fall more obliquely, less energy is available for warming the surface of the earth and lower layers of the air. The arid regions of the trade wind belts with their clear skies can therefore be the warmest on earth. Insolation is generally more intense as altitude increases.

In architectural planning in northern latitudes the aspect chosen for a building depends partly on making the most of the sunlight receivable at that particular place. In domestic buildings the best rooms are arranged to have a sunny aspect, a living room facing S.W. to S.E. Larders, pantries, etc., should face N.W. to N.E. Only in houses standing alone is there complete freedom of choice, for in grouped houses even where the architectural plan is elastic, it is not always possible to arrange that each room shall have the aspect most appropriate to it. Below is a table of hours of possible sunlight per day for lat. 52° N., e.g. southern England.

	hrs.	mins.		hrs.	mins.
Jan.	8	29	July	15	57
Feb.	10	19	Aug.	14	5
Mar.	12	7	Sept.	12	7
Apl.	14	14	Oct.	10	22
May	15	55	Nov.	8	43
June	16	40	Dec.	8	2

Insolvency (Lat. *in*, not; *solvere*, to pay). Term used in English law. A debtor is said to be insolvent if he cannot pay his debts, as they become due, out of his own moneys. It is, therefore, quite possible for a person to have assets exceeding his debts, and yet be insolvent, because he cannot realize his assets. See Bankruptcy.

Insomnia (Lat. *insomnis*, lying awake). Inability to sleep. Absolute sleeplessness is extremely rare. When a human being has reached a certain state of fatigue nature makes it almost impossible for him to keep awake. This means that it very seldom happens that anyone is really damaged either mentally or physically by having inadequate sleep. After a prolonged period of absolute sleeplessness even a few hours of sleep will

restore the organism to a remarkable degree. This has been proved by the experiences of soldiers in war time and of men and women exposed to various other special conditions. Severe pain or certain toxins which cause cerebral excitement may prevent sleep; but these are dealt with by suitable sedatives and pain or fever reducing drugs.

When a person is in a condition of stress or anxiety, his sleep is often disturbed and does not satisfactorily relieve his fatigue. It is usual for him to take a long time before relaxing sufficiently to go to sleep, or to wake after a few hours and lie awake and worry. Distressing dreams may occur.

Individuals vary widely under normal conditions in their sleep habits. Some need only four or five hours, others feel better if they have seven or eight; some people sleep early and wake early, others do the reverse. Many people increase their tendency to lie awake by being afraid that it will do them some injury if they cannot sleep, thus producing a state of anxiety and tension. It is important to reassure them that lack of sleep will not seriously impair their health either physically or mentally. Many drugs have been developed which can be used to relieve tension and induce sleep. Contrary to common belief, the sleep thus secured is normal and as restorative as sleep secured without them. The use of drugs greatly increased in the middle years of the 20th century; while taken in excess they have undesirable effects on the health, if taken in moderation and under a doctor's direction they can be of great help.

Inspector-General. A former office in the British army. Upon the abolition of the office of commander-in-chief in 1904, the rank of inspector-general of the forces was created, the duke of Connaught being the first holder. The duties included technical reports on the state and adequacy of fortifications and coast defences. The office was abolished in 1915, the duties being taken over by the chief of the imperial staff.

Inspiration (Lat. *inspirare*, to breathe into). Word commonly used to denote a supernatural influence or agency acting upon the human mind for the purpose of creating literature, especially sacred literature, which embodies the revelation of the Divine truth and purpose.

The term is more particularly used in connexion with the Bible and with other forms of sacred

literature, e.g. the Vedas, Koran, Zend-Avesta, but in a wider sense it is employed to describe the divine afflatus of all great poets and writers. Plato, for instance, in his *Ion*, speaking of the poet, says: "there is no invention in him until he has been inspired and is out of his senses. God takes away the minds of the poets and uses them as His ministers, just as He uses diviners and holy prophets in order that those who hear them may know that they speak not of themselves when they utter their priceless words in a state of unconsciousness, but that God is the speaker and through them is conversing with us." But while belief in inspiration is universal, there is the utmost diversity of opinion with regard to its character and mode of operation, especially in the production of the Bible.

The Human Agent

The most extreme theory regards the human agent as the passive instrument of the Spirit. His own mental activity is for the moment suspended, and in a state of trance he becomes the medium through which the supernatural revelation is communicated. As Philo puts it, "His reason departs and yields up the citadel of the soul; the divine spirit enters and strikes at the mechanism of his voice"; or, as the early fathers of the Church used to say, the Spirit acts on just men as a plectrum on a harp or lyre, or as a flute player upon the flute.

A modification of this theory abandons the idea of a hypnotic trance as the condition which makes inspiration possible, but still maintains that, though the human reason is awake during the process, it is so mastered and overpowered by the action of the Spirit, that it becomes the conscious penman or amanuensis of God—with the result that the inspiration of the product is plenary and complete—so complete indeed that the Formula Consensus Helvetica in 1675 laid down the doctrine that it extended even to the vowel points and accents of the Hebrew text, and Dean Burgon claimed that every clause and every syllable of the Bible was divinely inspired.

This extreme theory of inspiration in both its forms has been compelled to give way before the pressure of modern scholarship. We know, for instance, the method by which the historical books of the Bible were composed, and this method is absolutely at variance with the theory of plenary inspiration. Far from being the dictation

of the Spirit, we know that the historical writings of the Old Testament, and the synoptic gospels in the New Testament, were laboriously compiled out of earlier sources. S. Luke, for instance, in the preface to his Gospel, tells us, not that he listened for some communication of the Spirit to come to him, but that he gathered up "the testimony of eye-witnesses and ministers of the word" and "traced the course of all things accurately from the beginning." Moreover, the theory of verbal inspiration leaves unexplained the many slight discrepancies in the different Bible narratives of the same event.

No theory of inspiration, therefore, is likely to prove tenable which eliminates the personality of the human agent and does not admit the cooperation of the human mind with the Divine Spirit. If we admit the necessity of this cooperation, there is still room for the utmost divergence of view as to how much in the act of inspiration is due to the activity of the Divine Spirit, and how much to the human recipient. One theory, for instance, holds that the truth revealed is due to Divine action, but the words in which it is conveyed are the work of the recipient. It is impossible to devise a formula which would give scientific expression to the distinction between the divine and human contribution in the act of inspiration. There are degrees of inspiration. No one would dream of putting the book of Ecclesiastes on the same spiritual level with the second part of Isaiah, or of ranking the epistle of Jude with the fourth Gospel. The communication of Divine truth is necessarily conditioned by the personality through whom that communication is made.

A Definition of Inspiration

We may take as perhaps the best account of inspiration in accordance with the findings of modern scholarship, the definition of S. R. Driver: "However difficult it may be to define inspiration, or to determine the mystery of its operation, those who use the term may be supposed probably to mean by it an influence which gave to those who received it a unique spiritual insight enabling them thereby, without superseding or suppressing the human faculties, but rather using them as its instruments, to declare in different degrees and in accordance with the needs or circumstances of particular ages the mind and purpose of God." A definition such as this would permit us to extend the principle of

inspiration beyond the limits of the books of the Bible, because the bestowal of a unique spiritual insight is not the exclusive privilege of the writers of those books.

Character and Quality

In what sense, then, can it be claimed that the Bible possesses an inspiration which exceeds anything that can be predicated of other literature? The answer is simple. The character of inspiration is to be measured by the quality of the revelation. The measure of the difference between the revelation of Divine truth in the Bible and in other sacred literature is the measure of the difference of the quality of the inspiration. Those who believe in the supremacy of the Divine revelation contained in the Bible will claim a unique inspiration for those through whom that revelation was made known to the world. See Bible; Criticism, Biblical; Gospels.

H. T. Andrews

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Instar (Lat. *image*). Entomological term for the form assumed by an insect during any particular interval between succeeding ecdyses (moult). When an insect

hatches from its egg, it is in its first instar; after the first moult, in its second. The last instar is the imago (adult). Immature instars are larvae or nymphs according as their structure is fundamentally different from that of the imago or differs mainly in the absence of wings and reproductive organs.

Insterbürg. Historic name of a town in that part of former E. Prussia which was incorporated in the R.S.F.S.R. in 1945. It was renamed Chernyakhovsk, in honour of Ivan Chernyakhovsky (*q.v.*). It is 57 m. E. of Königsberg (Kaliningrad), at the junction of the rivers Instar and Angerapp, which here form the Pregel.

Insterbürg was founded by the Teutonic Order in the 14th century, growing up around their castle of Georgenburg. It is a manufacturing town, with chemical works, machine shops, iron foundries, food processing plants (sugar, meat), and flour mills, and trades in agricultural produce; it is also a rly. junction. The chief buildings were the 17th-century town church, and a 14th-century castle. In Aug., 1914, the town was occupied for two weeks by the Russians. In the Second Great War Insterbürg, first town of strategic importance on German soil captured by the Russians, fell to them Jan. 22, 1945. Pop. (est.) 45,000.

INSTINCT: FIXED BEHAVIOUR

Paul G. Espinasse, Professor of Zoology, Hull University

All living matter has what appear to be innate and ineradicable tendencies in activity. Here are considered the limits to which the term instinct can be properly applied. The article on Animal Locomotion covers a particular aspect of "instinctive" behaviour

The term instinct (Lat. *instigare*, to prick, incite) has been used at different times to denote various concepts. It finds a place in psychology as applied to human beings, but there is no agreement among psychologists as to its precise significance, or as to how man's instincts should be classified. Fundamentally, the word refers to something which is thought of as an ineradicable tendency inherent in the organism under discussion. Perhaps the easiest organism to think about is a single virus particle, which is believed to be a single protein molecule whose behaviour consists in the acquisition from the environment of smaller molecules and atoms and in the arranging of these into replicas of itself. So far as we know, given this pattern to start with, and given the materials in the environment to be captured, and given the right con-

ditions of temperature and so on, the virus particle will go on doing this indefinitely—that is to say, its behaviour is fixed, inherent, or instinctive. If its structure is changed, for instance by mutation, we are then thinking about a different virus, which will behave differently because it is different.

In passing from the consideration of the behaviour of a virus to that of such an organism as a fertilised egg, we find ourselves considering a situation in which something new has appeared. The organism is no longer capable only of forming replicas of itself. It does this still, but it does something else as well; the genes in the chromosomes in the nucleus of the egg organize their environment as well as reduplicating themselves. Indeed, the egg we see is that part of the environment of these genes which they have succeeded in so organizing. We now have a

pattern—the genes—within a pattern made by them—the egg. The possibilities of behaviour of this outer, secondary, and derived pattern are immensely complicated and constitute in their realization the behaviour of the egg in development and of the developed adult with no break in continuity.

This continuity of development is important. It must be realized that so far we have considered the organism objectively, and discussed its behaviour just as we may discuss the behaviour of any object whether living or dead. It is open to us also to speculate about the subjective condition of the behaving organism. The continuity of development, however, does not provide us with any critical point at which we become justified in doing this suddenly. Either we may speculate on the subjective state of a virus and an egg, or we may not speculate on the subjective state of a man.

The name for the act of speculating about the subjective states of organisms is the study of psychology. The name for the act of examining the objective behaviour of certain organisms is the study of animal behaviour. Both these activities are genuine sciences, but they are different, and to confuse them darkens counsel. They are concerned, as it were, with two sides of a sheet of paper, and a sheet of paper has two sides, however thin it may be.

Effect of Environment

All animals live in relation to an environment. The very act of living presupposes surroundings, because living consists in using and acting upon these surroundings. For this reason changes in the environment are very likely to involve changes in the behaviour of the animal. If the environment changes the animal is likely either to have to start living differently or to stop living. This somewhat obvious fact is described in conventional terms by saying that the animal “responds to changes in the environment,” or that it possesses “irritability.” In those animals which are not divided into cells, known collectively as the protozoa, the responsiveness appears to depend upon the structure of the particular creature, and as the structure is upon a molecular scale or on a very small anatomical scale indeed, we are as a rule unable to alter it significantly without killing the animal. The slipper animalcule, for instance, whose scientific name is *Paramecium*, will swim away from water

that is too hot, and will swim towards some substances suitable for food. We cannot stop it from doing this except by killing it or narcotising it, in which latter case nearly all its behaviour is reduced or stopped. Since its reactions to heat, acids, and food are for practical purposes individually in-eradicable, it seems proper to call them instinctive or inherent.

Physico-Chemical Changes

Turning now to animals which are divided up into cells, known collectively as the metazoa, we find that here there is an organization on a different scale. Some cells specialise in contracting, and some in conducting changes—almost certainly real physico-chemical changes—from one part of the organism to another. The contracting cells, or muscle cells, are arranged in an embryo in two rows, one down each side of the body. Contraction of these on one side makes the embryo curl that way. The conducting cells, or nerve-cells, are arranged in a tube down the embryo's back. In the embryo of an axolotl it so happens that the stages of development can be very easily followed, and it is found that the animal's behaviour gets more elaborate precisely as the distribution of nerves to the muscles gets more complicated. To begin with, there is only a single connexion from the front of each side of the animal's head to the muscles on the other side. At this stage a touch on the side of the head causes a contraction of the muscles on the other side of the body, so that the head is pulled away from the touched side. Later, there are connexions from the muscles on one side across the forward part of the nerve tube to the muscles on the other side, so that at this stage contraction of one set of muscles actually initiates subsequent contraction of the other set. In this way the head will be made to swing from side to side. This is an advance on the previous situation. Later connexions mediate the passage of waves of contraction down the animal's body. These waves follow each other on alternate sides, and this leads to a real swimming motion so that the animal progresses. This behaviour—this response—is instinctive. It inheres in the structure of the animal—in the relation of its nerves and muscles. Our ingenuity, however, enables us to eradicate it by severing nerves.

A great deal of the behaviour of animals, including the behaviour

of man, is mediated by just such structures and arrangements as have been here indicated. In insects and in many other forms it appears that virtually the whole of their response to their environment—their behaviour—is so mediated, and can be changed only by operative interference. It is what is popularly and quite properly known as instinctive. We draw our hands away from a hot plate because of an arrangement which is in kind similar to the arrangement which mediates the swimming of an axolotl, the extremely complicated behaviour of insects in building nests or making traps, and all those multitudinous activities carried through by animals of every kind, mechanically and without learning.

Behaviour of Insects

It is in this last phrase that the crux of the matter lies: “without learning.” An insect will continue to carry out its inherent pattern of behaviour quite regardless of anything we may do to make such behaviour inappropriate. In the vertebrates, the group to which man belongs, and to a considerable extent in some other groups, e.g. the octopuses and squids, learning is possible because of a nervous arrangement which in a real sense stores experience. Persistent nervous patterns or constellations come into existence as a result of the reception by the animal of stimuli from outside. The presence of these patterns changes the possibilities of the animal's behaviour. It has learnt. These patterns are not inherent in the same sense as are the patterns which lead to our withdrawing our hand from a hot plate. We instinctively draw back our hand, but it is only the burnt child that dreads the fire. The moth never learns to dread the candle, because it has no means of forming new neural patterns.

It has long been customary to “explain” animal behaviour (including human behaviour) in terms of “instincts” each of which is taken to stand for a whole piece of behaviour generally named from the end to which that behaviour is considered to be directed. Thus it is common to speak of a “mating instinct” or the “instinct of self-preservation.” So long as it is realized that such a way of speaking is a piece of picturesque teleology, no particular harm seems to flow from it. If, however, we allow such a phrase as “the mating instinct” to cover all we imagine about the subjective state of the animal whose behaviour we con-

sider to be directed towards mating as well as this behaviour itself, and proceed to ascribe qualities at will to the entity so erected, we are apt to find ourselves with an explanation more cumbersome than the facts with which we started. This means that we can do nothing more with our explanation than we could do without it. When this is so, it means that our science has been bad, that our entities have been fruitlessly multiplied.

Animal behaviour can be understood by observing the behaviour of animals from protozoa to man, and by relating it to structure and to environment, of which it is the result, and by describing our observations in terms which involve the fewest special concepts. This is science.

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Institute of France. General title of the group of the five great learned societies of France. These are the Académie Française (*q.v.*); the Academy of Inscriptions and Belles-Lettres, founded by Colbert, 1663, devoted chiefly to the study of history and antiquities; the Academy of Science, founded by Colbert, 1666, divided into two main branches of mathematical and philosophical sciences; the Academy of Fine Arts, finally constituted as such in 1816, including painters, sculptors, architects, and music composers; and the Academy of Moral and Political Sciences, constituted in 1832, with members representing philosophy, legislation, jurisprudence, economics, and finance, etc. The total number of members of the Institute is 228, elected under presidential approval, and there are also honorary members and foreign associates.

The Institute was established by the law of Oct. 25, 1795, and had its first headquarters in the Louvre. Its home since 1806 has been in the Collège des Quatre Nations, on the Quai de Conti. It receives an annual grant from the state, and awards literary and scientific prizes, in particular the triennial Prix Osiris of 100,000 francs for a notable discovery or publication. It is not to be confused with the Institut Français

(*q.v.*), a French educational organization in London.

Institute of International Affairs, ROYAL. For details of this organization see International Affairs, Royal Institute of.

Institutes (Lat. *instituere*, to establish). Term used for certain treatises on law. The best known are those of Justinian and of Coke. The former, an exposition of Roman law, compiled about A.D. 533 for the benefit of students, is apparently based on a similar work by the jurist Gaius. It gives an excellent idea of Roman law, and throws considerable light on the social conditions of the time. The juridical conceptions are advanced, and form the basis of a great part of the law of Western Europe to this day.

Coke's Institutes, 1628, is a compendious treatise on the whole body of English law of his day. Many modern authors have cast discredit on his work, pointing out that he lacked the faculty of consecutive thought and logical system; but however deficient Coke may have been as a theoretical jurist, his statements of the laws of England are of the highest authority; and the Institutes, always cited as *The Institutes*, are a classic. The first volume, which is the most valuable, is on tenures. It is frequently called Coke upon Littleton, as it is a commentary upon the older work of Littleton on tenures. The second volume deals with Acts of parliament. The third is a treatise on pleas of the crown; and the fourth treats of the courts of the day.

Institut Français. A French educational organization in London. Founded in 1910 under the auspices of the university of Lille, it was at first known as the Université des Lettres Françaises. In 1945 it was handed over by the administration to the French government. Classes are held and lectures are given by the French university graduates who form the staff, and there are other cultural activities, the purpose being to foster understanding between Great Britain and France. The headquarters are at Queensberry Place, S.W.7, where an excellent French library is open to members.

Institution. Term in ecclesiastical law for the formal investiture, in church or cathedral, of a clerk in holy orders, after presentation by the patron and approval by the church council. The bishop invests him with the spiritual functions of a benefice and commits to his charge the care of the

souls of the parish. Upon institution the clerk may enter on the parsonage house and glebe and receive the income, but he cannot let them or bring an action for them until after induction (*q.v.*), which usually follows immediately upon institution.

Institutional Church. Name used for a church which possesses activities not traditionally associated with church work, i.e. social, philanthropic, and educational work of various kinds. The term is said to have been given first to Berkeley Temple, Boston, and the movement originated certainly in the U.S.A., where an Open and Institutional Church League was founded in 1894, and where there are many churches of the kind. Schools and colleges are attached to some, and provision is made for amusements. The movement spread to nearly all denominations. In Great Britain it spread less rapidly, although in a sense almost all churches are institutional in that they have activities beyond the holding of religious services. A prominent example was Whitefield's Tabernacle, Tottenham Court Road, London.

Institutum Divi Thomae. Graduate school of scientific research of the Athenaeum of Ohio, U.S.A. Founded in 1935, it was devoted to assisting in the war effort in 1942-45, but has been reconverted to a peace-time schedule of research and training. The principal laboratories of the school are in Cincinnati, with a series of subsidiary laboratories engaged in research throughout the U.S.A.

Instone, SIR SAMUEL (1878-1937). An English business man. Born at Gravesend, Aug. 16, 1878, he founded and became chairman of the shipping firm of S. Instone and Co., Ltd. He was also chairman of iron and coal concerns and, after starting the first regular London-Paris air service in 1919, became a director of Imperial Airways in 1924. Knighted in 1921, he died Nov. 9, 1937.

Instrument of Government. Name given to the constitution under which England, Scotland, and Ireland were governed from Dec., 1653, to May, 1657. After the failure of Barebones's parliament the country was without any regular government, except that of Cromwell, the lord general, and the council of state. To provide one, Lambert and other officers drew up a constitution which, with some alterations, was accepted by Cromwell.

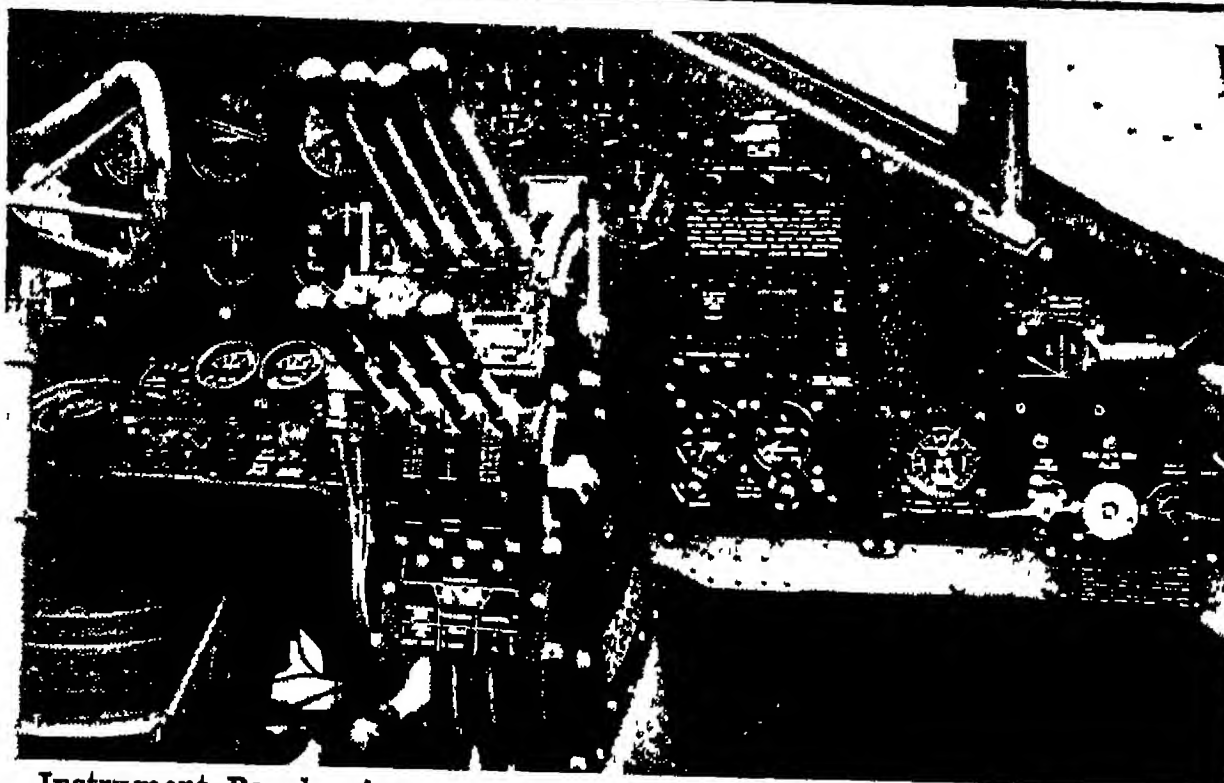
The Instrument consisted of 42 articles. It appointed a lord protector and a council of state, its members numbering from 13 to 21. Elaborate arrangements for electing new councillors were provided; they were chosen for life. It was decided that a parliament should meet on Sept. 3, 1654. This would consist of a house of commons only; 400 members being returned by England, and 30 each by Scotland and Ireland. It was a reform measure, as more members than heretofore were sent by the large towns. The parliament was to meet once in every third year, and could not be dissolved for five months. It could legislate freely, the only thing the protector could do being to delay such legislation for 20 days. Roman Catholics were disfranchised. The protector was given power to raise revenue and to maintain an army and navy. The consent of parliament was necessary to the appointment of high officers of state.

The parliament met, but difficulties with Cromwell soon developed, the members criticising the Instrument, and in five months it was dissolved. A second parliament was called in Sept., 1656. This drew up the Humble Petition and Advice which took the place of the Instrument. Although a failure, the Instrument occupies a prominent place in the history of constitutional theory.

Instrument Panel. In aeronautics, the assemblage of instruments which are provided to assist the pilot. It is usually fitted with instruments of three classes: (1) those to assist in the handling of the aircraft itself; (2) engine instruments; and (3) navigational instruments.

In an aeroplane the first-named normally includes altimeter or height indicator; air speed indicator, showing the speed through the air of the aircraft; turn and bank indicator; artificial horizon; and rate of climb indicator (statoscope). An automatic pilot (*q.v.*) is often fitted.

The instruments of the second class vary according to the type of engine in use. A revolution counter (tachometer) showing the speed of the engine, and a petrol gauge or gauges showing the amount of fuel remaining in the tank, are essential. In addition, a fuel pressure gauge, oil pressure gauge, and boost gauge (if a supercharger is fitted) are normally included for each engine. The navigation is based on a compass



Instrument Panel. Arrangement of panel in heavy bomber showing the multiplicity of navigation and engine indicators

and the gyroscopic flying instruments, with the aid of radio and/or radar (*q.v.*) and often of blind landing equipment.

Insubres. Celtic tribe who settled in ancient Italy in Gallia Transpadana. They inhabited the district between the river Ticinus and lake Larius (lake of Como), and their capital was Mediolanum (Milan). The most powerful Celtic tribe in Italy, they were defeated by the Romans in 197 B.C. and finally submitted after the fall of Comum in 196. *Pron.* Insu-breez.

Insulation (Lat. *insula*, island). The isolation of a body or structure against the passage of heat, sound, vibration, or electricity. The term is applicable equally to the method employed, and to material interposed to impede the movement of, if not wholly to confine or exclude, the free energy. In practice, thermal insulation is described as lagging, sound absorbent measures and substances as deadening, and anti-vibratory devices as damping or isolating units; while in electrical insulation the material used is termed a dielectric.

Insulation against sound is achieved by methods which absorb the wave energy of the movement, or break up the waves into innumerable smaller parts. The materials may have a cellular structure, or be of an elastic nature; or both these qualities may be combined in the same material. In the case of heat insulation the conduction of energy is hindered by the cellular or compartmental nature of the insulating medium, or by its comparatively inert nature; in some materials the ability to reflect heat rays is also utilised. Insulation against vibration is effected by interposing an elastic substance to absorb and damp out the

vibrations. The medium may be a liquid one, to which the unwanted movements are imparted by a piston connected to the vibrating member. An example is the oil dash-pot used to damp out the vibrations of the pointer of a weighing machine. Electrical insulation opposes a non-conducting barrier to the current.

Still air is used extensively in both lagging and deadening, though not with maximum efficiency in cavity walls and double windows, owing to the large air spaces and insufficient sealing. Lagging materials, necessarily low in heat conductance, are preferably incombustible as well as chemically inert, and neither hygroscopic nor likely to harbour vermin. Insulating efficiency depends largely upon the stillness of the air held within a multiplicity of minute cells in the texture of the material; and, to a lesser extent, upon the heat reflecting property of the walls bounding the cells. In practice some degree of diathermancy (transmission of radiant heat) is unavoidable, and best results are achieved by a smooth, polished surface to minimise radiation from the covering.

Granulated cork and powdered or fibrous materials such as diatomaceous earth, magnesia, asbestos, mica, and slag wool may be loosely packed into rigid compartmented casings; or mixtures of these, together with added plaster or other adhesive, may be wetted and applied as a paste, with or without wire reinforcement. Alternatively, such material may be preformed into slabs for lining cold stores and heat-treatment ovens, moulded to rigid shapes to suit pipes and fittings as in Fig. 1, or packed into compartmented canvas casings to form sheets and strips of quilting for use as in

Fig. 2. The thickness of such coverings, normally from 1 in. to 2 ins., varies directly with the higher temperature involved

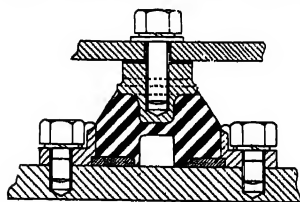


Insulation. 1. Preformed sectional pipe covering of glass silk, magnesia, asbestos, etc.

and/or the desired difference of temperature between the inside and outside of the covering. Glass silk, used extensively for temperatures below 900° F., derives its unusually high efficiency from the polished surfaces of the fibres forming the essential air cells. This is not applied as a paste, but is widely used as in Figs. 1 and 2, and is the most effective material for domestic frost precaution, when it is used in canvas-backed strips as shown in Fig. 3.

Many of the materials used as lagging, notably glass and other quiltings, are used for sound insulation, as well as sound absorbent plasters and deadening partitions of fibre board of cellular eel grass and wood wool. The lining of the inside surfaces of external walls with $\frac{1}{2}$ -in. thick fibre board materially reduces both outside noise and sun heat in summer, and also effects appreciable fuel economy in winter by reducing heat loss.

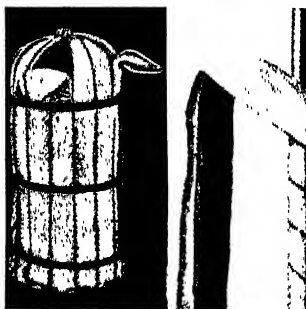
The damping-out of vibration requires an elastic medium in which the free energy may be dissipated by the internal friction



Insulation. 4. Compression type rubber and metal anti-vibration pedestal (rubber shewn striped)
T. B. Andre Rubber Co., Surbiton

and resilience of the cushion. Light movement from an electric motor or ventilating fan can be countered by a sandwich of concrete and felt in a concrete base. Heavier units, particularly reciprocating and impact machines, are more effectively isolated by anti-vibration mountings of rubber bonded to metal as seen in Fig. 4. Lighter pedestals of similar construction are used to protect delicate instruments.

ELECTRICAL INSULATION. To isolate an electrical conductor from earth or from another conductor at a different potential, a so-called non-conductor, or insulator, of electricity, i.e. a material whose electrical resistance is extremely high compared with a conducting body, is used. The term insulator is loosely applied to any support or bushing of porcelain, glass, plastic, and the like; examples in common use



Insulation. 2. Higson Eeto jacket for hot water cylinder with hoop iron girdles. 3. Right, canvas-backed glass silk strip as used to protect water pipes against frost

vary from the small porcelain insulators used on telephone lines to the large strings of insulators used on grid lines.

The majority of non-metallic bodies are non-conductors of a sort, but not all possess the properties necessary to a successful insulating material. In addition to high resistance, such a material must withstand high temperatures, and also temperature changes, and must have high puncture strength (resistance to internal breakdown under high electric stress either continuous or suddenly applied) mechanical strength, durability, low moisture absorption, flexibility, and freedom from tracking, i.e. the formation of a conducting path of carbonised material due to local heating caused by surface leakage.

Oil is a very good insulator, but is suitable only if the object to be insulated can be immersed in it. Solid insulators include rubber, cotton, silk, paper, slate, marble, glass, porcelain, bitumen, wax, wood, and a variety of plastics ranging from bakelised paper to nylon. High-tension cables are wrapped with paper which, on account of its absorption of moisture, must be impregnated with oil or a bitumen compound, sheathed in lead and carefully sealed at all joints. For low-voltage cables rubber, a number of

rubber-like synthetic compounds, and varnished cambric are used. Wires for coil or armature winding are lapped with cotton or silk; have a coating of high-quality enamel, or a combination of enamel and silk or cotton; or with spun glass fibre, which withstands higher temperatures and thus makes it possible to produce more power from a motor of given size. Since glass fibre, like asbestos, absorbs moisture, it must be impregnated with a varnish, and this limited working temperatures until a varnish prepared from the important chemical family known as the silicones (*q.v.*) proved resistant to temperatures very much higher than the boiling point of water. See Cable; Conductor; Dielectrics.

Insulin. Substance secreted by tiny groups of cells, known as the islets of Langerhans and located in the pancreas. This secretion, isolated in 1922 by Banting (*q.v.*), controls the amount of sugar in the blood; its precise action is not understood. Extracted from the pancreas of animals, in particular sheep, it is used in the treatment of diabetes (*q.v.*) by injection, the dose being calculated according to individual requirements. It is manufactured under licence, and is available as soluble insulin, a water-clear fluid which circulates quickly and acts strongly, but whose action is of short duration; and as protamine zinc insulin, a milky fluid made by the addition to soluble insulin of protamine from fish roe and traces of zinc, the action of which is slower but more lasting. An overdose of insulin causes hypoglycaemia (*q.v.*).

The adrenal glands and the islets of Langerhans work in harmony, and an injection of adrenalin causes a flow of insulin, while an injection of insulin stimulates the output of adrenalin.

Insull, SAMUEL (1859-1938). United States financier. Born in London, Nov. 11, 1859, he went to America in 1881, and was private secretary for many years to Edison. He promoted and managed a number of companies, chief of which was the Insull Utility Investment Inc., and became one of the world's leading financiers; but in 1932 had to flee to Europe to avoid arrest on embezzlement charges. He was extradited from Greece in 1934 at the request of the U.S. authorities and stood trial in Chicago, being acquitted after eight months in the dock. He died in Paris, July 18, 1938.

INSURANCE: LIFE, MARINE, FIRE, ETC.

Sir Edward Mountan, Chairman 1917-48, Eagle Star Insurance Co.

A history of the practice of insurance, and an account of the different covers that can be effected through companies and societies. It is followed immediately by a separate article on National Insurance. For war insurance see under War Damage

Insurance, or assurance, is a device by which a group or a corporation, called the insurers, undertakes to cover the risk of pecuniary loss arising from death or personal injury, or from the destruction of, or damage to, property, owing to perils of any kind to which an individual or group (the insured) may be exposed. This service is undertaken in consideration of the payment of an appropriate premium, either in a single sum or by periodical payments.

The essence of the transaction is that losses, whether inevitable or problematical, are transferred to the shoulders of other parties whose business it is to undertake and average a large number of similar transactions and who, by reason of the broadening of the basis, are able to sustain such losses with equanimity. In other words, when a claim arises, to quote one of the earliest English statutes relating to marine insurance, "there followeth not the undoings of any man, but the losse lighteth rather easilie upon many, than heavilie upon fewe."

Assurance and Insurance

"Assurance" is applied more particularly to life contracts and "insurance" to marine, fire, and miscellaneous risks; but there is no clear distinction between the use of the two terms. It is important, however, to recognize the fundamental difference between a life policy and a policy relating to one of the other forms of insurance. The life policy is concerned with an event which is bound to happen, and in regard to which a claim must eventually fall upon the insurers, while in nearly all other forms of insurance no claim need arise, the contract being an indemnity protecting the policy holder against loss if and when the contingency insured against should materialise.

A further important difference is that a life policy is not a contract of indemnity, like a fire, marine, or accident insurance, but a contract to pay a certain sum on the happening of a stated event. Hence there is no legal limit to which a person may insure his own life.

All insurance contracts are based on the legal doctrine of *uberrimae fidei*—that is to say,

the utmost good faith must be shown on both sides. Misrepresentation or omission to state a material fact when proposing a risk voids the contract.

The insured has no right of claim against his insurers unless he has an "insurable interest." This means that the happening of the event insured against must prejudice his interests or its not happening be of benefit to him.

History of Life Assurance

One of the earliest records of the science of life contingencies is John Graunt's *Natural and Political Observations on the Bills of Mortality*, 1662. This contains a rudimentary attempt to give what is now known as a mortality table, a table showing the numbers surviving at successive ages out of those born.

By the end of the 17th century the issue of policies dependent on human life had become of some commercial importance, for in *The Compleat Compting House*, by John Vernon, 1678, it is stated, "Other assurances are made upon the lives of men and women at a rate that is moderate; for by this means, if you buy any place or office that is worth £1,000 or more or less, and if you have not money enough to purchase it you borrow £400 or £500; now if you die and are not in a condition to pay this money it is lost; but if you insure your life, then your friend that you did borrow it of will have his money honestly paid him." The transactions referred to were no doubt assurances for temporary periods such as might be required to protect the policy holder against the perils of travel or other risks arising during a limited period, and there is nothing to suggest that policies familiar at the present time, running for the whole of life and subject to annual premiums, were known at that date.

In the *Transactions of the Royal Society* for 1693 there is a paper by Edmund Halley, *An Estimate of the Degrees of the Mortality of Mankind drawn from various Tables of Births and Funerals at the City of Breslau*, with an attempt to ascertain the price of Annuities of Lives. In the first half of the 18th century other works dealing with life annuities

and assurances followed, among them De Moivre's treatise on Annuities on Lives and Reversions, 1725, and Thomas Simpson's work *The Doctrine of Annuities and Reversions*, 1742.

In the meantime companies had been formed in England having amongst their objects the granting of benefits dependent on life. Thus in 1698 an institution was established by the Mercers' company in London with the object of granting life annuities to widows of members; while in 1699 a similar association, the society of assurance for widows and orphans, was formed. Both associations enjoyed a very brief existence.

The Hand-in-Hand company was founded in 1696. In 1705 the Amicable Society for a perpetual insurance office was formed, while the London assurance corporation and the Royal Exchange assurance corporation, 1720, for transacting marine insurance, shortly afterwards began to issue life policies.

Whole Life Policies

The Equitable assurance society contained the first germ of life assurance as now practised. This company started business in 1762 and speedily recognized the fact, previously overlooked, that the premiums payable by policyholders must depend on the age of the life insured. Moreover, subject to the payment of periodical premiums to the office, it granted policies for the whole duration of life, and not merely for limited periods. The premiums originally charged by the Equitable society for whole life assurances were, up to about age 40, double the rates now quoted by many offices—and experience soon showed that rates could safely be reduced.

A growing practice of effecting speculative policies received a check by the passing of the Life Assurance Act, known as the Gambling Act, in 1774. This Act provided that no assurance should be effected unless the person in whose favour the policy was taken out had a pecuniary interest in the life to be assured.

Between 1800 and 1843 about 150 new life companies were established, between 1843 and 1870 another 340. The passing of the Life Assurance Companies Act, 1870, with its provision for deposit, checked this multiplication of companies; and fewer than 50 of those formed before 1870 retained an independent existence into the middle of the 20th century.

LIFE ASSURANCE. In the U.K. life assurance is divided into two categories: ordinary and industrial. Ordinary life assurance is without limitation as to amount, and involves in most cases payment of a premium yearly. Industrial assurance, on the other hand, is subject to limitation of amount in the case of children, and premiums, often a few pence, are collected weekly or monthly at the policy holder's home.

Life assurance in Great Britain is effected by two types of institution, limited liability companies, in which shareholders take about 10 p.c. of the profits, and mutual societies, in which all profits are divided among with-profit policy holders. They are subject primarily to the provisions of the Assurance Companies Acts, 1909 onwards—legislation which now regulates the conduct of insurance business generally, but originally applied particularly to life business. Important sections of the Act of 1909 provide for: (1) separation of the life fund from the institution's other funds; (2) the preparation of a revenue account and balance sheet in prescribed forms at the end of each financial year; (3) periodical investigation at least once in every five years into the financial position of the life department of the institution, to be made by a qualified actuary, and submission of full details of the valuation in certain schedules appended to the Act; and (4) compliance with certain requirements designed for the protection of policy holders in the event of the winding up of the institution or its amalgamation with another. There was formerly a statutory obligation, which was abolished in 1946, to deposit £20,000 with the high court in respect of each class of business handled. In Canada, no one may act as an insurance agent or broker without being licensed.

Industrial Assurance

Industrial assurance is carried on in the U.K. by 15 companies and about 150 collecting societies. In its origin a method of provision for funeral expenses, it came to be more accurately regarded as an important form of thrift among weekly wage-earners. At the end of 1943 there were over 90,000,000 policies in force, and policy-holders' funds amounted to nearly £500,000,000. Nowadays industrial life offices generally deal also with ordinary life business.

The principal classes of life assurance are: (1) whole life—

the sum assured being payable on the death of the assured; (2) endowment—the sum assured being payable at a given age, or at the end of a fixed term of years, or at earlier death; (3) short term—the sum assured being payable only in the event of the life assured dying within the specified number of years for which the insurance is effected; (4) convertible term—a short term carrying with it the right of conversion at any time, before the expiration of the term, to a whole life or endowment assurance (with or without profits), without further evidence of health, on payment of the premium for the age at the time of conversion. A popular form of assurance called the family or income benefit policy combines whole life or endowment assurance with short term cover and assures, in addition to a capital sum, a quarterly payment until the end of a stated period, usually 20 years from the inception of the policy. By this means, a young married man can, at an economical cost, assure for his widow both a principal payment and an income payable during the most difficult years, should he die prematurely.

Deferred Assurances

House purchase is frequently arranged through the medium of an endowment assurance on the life of the purchaser, the policy being assigned to the mortgagor and the sum assured being applied to repay the mortgage advance at maturity or at the borrower's earlier decease. Children's deferred assurances and policies designed to cover the cost of a child's education are other forms of assurance which include life cover.

Both whole life and endowment assurance policies can be effected on either a non-profit or with-profit basis. Conditions vary somewhat, but surrender values, generally at least one-third of the total premiums paid, are allowed after the payment of three years' premiums in the case of a whole life policy and two years' in the case of an endowment assurance, or the policy can be converted into a paid-up policy. A loan can usually be obtained from the institution at the current rates of interest up to 95 p.c. of the amount of the surrender value. Thirty days are allowed for the payment of renewal premiums.

Most policies are free from restriction as to foreign residence or travel and occupation of the

assured once they have been issued. Under the Income Tax Acts of the U.K. policy holders are entitled to a rebate from their income tax in respect of life premiums, subject to certain limitations (see Income Tax).

Life assurance has been adapted to cover pension schemes promoted by firms on behalf of their employees. Group life pension schemes were first promoted in the U.S.A. and introduced from there into the U.K., and were underwritten by many British offices, who later developed other forms of pension schemes.

MARINE INSURANCE. This is much older than life assurance, having been transacted in some form in the ancient world. The earliest recorded use of the term marine insurance was in 1310 when the court of Flanders permitted the establishment in Bruges of a chamber of assurance, "by means of which the merchants could insure their goods exposed to the risk of the sea or elsewhere on paying a stipulated percentage."

This class of insurance was probably established in England considerably before the 15th century, but the earliest English policy of which record exists is one dated 1613 on a ship called the Tiger.

John Vernon, writing in 1678, describes the manner in which goods and merchandise carried by ship could be insured, and how in the event of loss at sea the amount payable could be insured.

The Beginning of Lloyds

Lloyds, now known all over the world for its dealings in marine insurance, dates from the late 18th century. The earliest English companies to transact marine insurance were the London Assurance and the Royal Exchange corporations, both formed in 1720. The Alliance Marine and General company was formed in 1820, the Indemnity company in 1824.

The need felt throughout the 19th century for a code which would embody the various judgments on the subject found expression in the Marine Insurance Act, 1906, which set the standard for British marine insurance. The Marine Insurance (Gambling Policies) Act, 1909, was intended to stamp out dealing in wager policies, i.e. policies where there is no insurable interest.

The business of marine insurance can be divided into two main classes, viz.: (1) the insurance of the body of the ship and of the owner's other interests; and

(2) the insurance of the cargo. In the first class the owner insures the hull or, in the case of a steamer, the hull and machinery, against marine perils, and in addition insures his freight payable at destination and his disbursements. There are various standard forms adopted to meet his requirements, the operative clauses being known as the institute time and voyage clauses.

Hulls are insured for twelve months on the basis of certain limits for trading which are known as institute warranties, additional premium being paid when these limits are exceeded. Twelve months is the usual period also for the insurance of freight and disbursements.

Insurance of Cargo

There are two recognized forms of insurance of cargo. The older form is known as f.p.a., i.e. free of particular average. Under an f.p.a. cover, the underwriter does not pay for damage sustained by the goods unless the vessel has been stranded, sunk, or burnt, or the damage has been caused by collision or explosion or can reasonably be attributed to fire. This clause has been elaborated considerably, and the policy now covers the risk from warehouse to warehouse, as well as the loss of goods in transshipment and damage owing to discharge through the vessel's putting into a port of refuge. The policy also pays general average, salvage charges, and, of course, total loss. The other form is known as a with-average policy. Under this policy the underwriter pays claims for damage from a sea peril if the claim amounts to a stipulated percentage, known as the franchise, the usual percentage being £3 per £100, on each package.

FIRE INSURANCE. In a primitive form, fire insurance was in operation centuries ago, examples of taxes comparable with fire insurance premiums having been traced in the records of pre-Christian Rome, and in other early Mediterranean communities. As regards England, levies for the benefit of members suffering fire damage were commonly made by the guilds and corporations of medieval times, and fire insurance contracts were undoubtedly issued long before the Great Fire of London; but it was not till that disaster had drawn attention to the need for providing against loss through fire that fire insurance became popular. The Fire Office, established at the Royal Exchange

soon after the fire, undertook the insurance of houses at a premium of 2½ p.c. of the yearly rent for brick houses and 5 p.c. for frame houses. Some years later an office known as the Friendly Society set up in competition with the Fire Office. The Hand-in-Hand, the General Insurance Office, and the Charitable Organization are other names associated with the early history of fire insurance; the last-named undertook the insurance of household goods, not previously insurable.

The formation of the Sun Fire Office in 1710 and of the Union in 1714 inaugurated an era of rapid expansion in fire insurance business, and hundreds of new fire offices were established in the next 200 years. Some of these survive under their original names, some have been wound up, and many have amalgamated with one another.

The good faith which is the essential feature of fire insurance contracts implies that the proposer shall not merely disclose all the facts needed to enable the insurer to estimate the risk, but shall keep his insurers informed if anything is done to increase the risk of fire after the contract has been agreed. Failure to observe these requirements violates the policy.

Standard Fire Policy Form

Most fire policies issued in Great Britain are drafted on the standard fire policy form agreed on by the offices in 1923. The use of this form has resulted in a uniform cover and conditions and eliminated many of the difficulties which were apt to arise before the introduction of the form, whenever a number of different policies had to contribute to reimbursement of the same loss. The standard fire cover excludes fire caused by spontaneous fermentation or heating, war, riots, civil commotion, and military or usurped power; but includes damage caused by lightning, and explosion of boilers or gas in domestic use.

Fire policies can be issued subject to average or free of average. In the first, if, when a loss occurs, the property is found to be under-insured, the insured is regarded as being his own insurer for the difference between the actual value and the sum insured and has to bear a proportionate share of the loss. Thus, if there is an insurance for £1,000 on property worth £2,000, and the policy is subject to average, the insured loses £1,000 in the event of a total loss; while, if the loss is a partial one of £500, he shares

the risk with his insurers in the same proportion and receives only £250. If, on the other hand, there is no average clause in the policy, he recovers the full amount of the loss up to the sum insured, and is penalised only when the loss exceeds his sum insured. Average is included in British fire policies particularly where the property insured is spread over two or more locations.

Varying Rates for Fire Risks

The rates for fire insurance are based on the loss experience of the insurers in the various classes of risk and range from 1s. 6d. p.c. for the building of a private dwelling to £5 5s. p.c. for textile waste mills. For many industries, most companies charge the same premiums, by mutual arrangement, but some risks are rated independently according to the individual experience of the company. For industries rated by the pooled experience of the offices, additional charges to the normal rate are made for bad features in a particular risk, while discounts are given for good features such as sprinklers and fire extinguishing appliances.

Insurance consists essentially in the distribution of the incidence of loss, and as the possibility of a disastrous conflagration must always be faced the insurers fix limits for all classes of risk. When a company accepts an insurance for an amount exceeding its limit the excess amount is reinsured.

Reinsurances, which are arranged in connexion with all types of insurance business, are arranged under two main headings: by treaties with various reinsurers who are bound to accept stipulated proportions of all insurances ceded to the group; or by facultative arrangements, under which the reinsurers are at liberty to accept or decline the risk offered. It is not unusual for a company to pay its assured as much as £100,000 yet not lose itself more than £5,000, recovering the balance from its reinsurers.

Fire insurance practice has undergone many striking developments in the 20th century. Loss of profits and consequential loss following fire are now almost invariably insured, while fire policies are frequently endorsed to include cover against riots, aircraft, explosion, and water damage; sprinkler leakage policies are also issued by the fire departments of the insurance companies. Further, adjustable and

declaration policies, providing for fluctuating amounts at risk, are issued for the convenience of those owning stocks whose extent and value are subject to variation. From the fire departments also come the popular comprehensive policies for private houses; and some offices issue similar policies covering a variety of risks for schools, boarding-houses, hotels, and retail shops.

Some indication of the scope of fire insurance is given by the returns of the insurance companies in respect of property in the L.C.C. area, the total sums insured amounting in 1943 to £2,341,946,143. The fire premium income of the offices for 1944 exceeded £68,000,000.

The operations of the British fire offices are world-wide, and their reputation for integrity and stability has preserved their foreign business for them through all the troubles and difficulties of the present century. Possibly as much as 60 p.c. of the fire premium income of British insurance companies comes to them from abroad.

OTHER INSURANCES. Accident insurance is of comparatively recent growth, and has expanded rapidly. In 1870 there were only six or seven companies transacting accident business and the total premium income did not exceed £250,000; there are now over 100 companies and the total premium income in 1943 was over £50,000,000, excluding motor business. Workmen's compensation business (the premium income from which amounted to more than £16,000,000 in 1943) ceased to be handled by companies under the National Insurance (Industrial Injuries) Act, 1946.

Burglary Insurance

Burglary insurance covers the insured against burglary, house-breaking and, in some cases, larceny. "All risks" policies insure specified articles, usually jewelry, furs, and other valuables, against loss from any cause. Goods in transit can be insured against theft and damage, and livestock against death and also for special risks such as foaling and service. Plate glass policies cover the risk of breakage, and can be extended to include resultant damage to goods in shop windows.

Personal accident policies, originally introduced to cover only railway accidents, were gradually extended to all accidents, then to accidents and specified diseases,

and finally to all accidents and all illnesses.

Public liability policies protect the insured in respect of claims brought, on the grounds of negligence, for personal injury or damage to property. This class of policy more particularly applies to the driving of horse-drawn vehicles and cycles, and to builders and contractors, shopkeepers and property owners; but there is a big demand nowadays for public liability insurance from all kinds of organizations and individuals.

An important feature in engineering insurance is the periodical examination which the companies make with a view to preventing breakdown and securing increased efficiency in the plant. The insurance companies issue the certificates required under the Boiler Explosion and Factory Acts. Weather insurance can also be effected.

Obligatory Insurance for Motorists

The Road Traffic Acts of 1930 and 1934 made it obligatory for every motorist to insure his liability to the public in connexion with road accidents; and in addition to this legal minimum protection, he can insure against damage to his own vehicle, fire

and theft risks, personal accidents, legal and medical expenses, and other inconveniences arising out of collisions on the road.

The most recent form of insurance is aviation insurance. The risks normally covered by a comprehensive policy are those of third party, legal liability to passengers, and personal accident to crew and officials; and, as regards damage to aircraft, the risks of crash damage, accidents on the ground, or mooring damage in the case of seaplanes, fire, and theft. The term "hulls covers" is applied to those sections of the insurance which concern damage to the aircraft itself. Cargo can also be insured under an aircraft policy.

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INSURANCE, NATIONAL: STATE CARE

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The development of national care for the sick, the disabled, the unemployed, and those bereft of their breadwinner is here traced from its inception in Germany in 1883 to the comprehensive Acts passed in Great Britain in 1946. See also Beveridge Report; Disabled Person; Health, Ministry of; Old Age Pension; War Damage; Workmen's Compensation, etc.

Social insurance may be defined as the insurance of all workers against the special contingencies to which their livelihood is exposed, and through which their activity stops temporarily or permanently. Such contingencies are: industrial injury caused by accident or disease in the course of employment, sickness, invalidity, old age, premature death, involuntary unemployment. Through all such possibilities workers and their families have a constant feeling of insecurity, which is an obstacle not only to their own well-being but also to the satisfactory organization of industry and social peace.

Measures to cope with the social effects of such contingencies go back to the fraternities and guilds of the early Middle Ages. With their disappearance in the 17th century, the worker was left to self-help in the form of co-operative insurance on a voluntary basis; this led to the formation of

friendly societies, the nucleus of social insurance. As industry developed, it became evident that voluntary social insurance of this kind was neither comprehensive enough, nor were the benefits granted sufficient, to protect the workers adequately against the ever-increasing risks to their social well-being. It became imperative that some form of compulsory insurance should safeguard workers against the economic effects of these risks, and that the state should play its part either by administering social insurance or by assisting financially schemes instituted and administered by the parties, i.e. employers and employees.

Compulsory social insurance, introduced in Germany in 1883, gradually conquered the world. "In every continent, and under every political, economic, or social system, whether liberal or authoritarian, collectivist or capitalist,

compulsory insurance is recognized as an essential factor of any rational social policy," states the I.L.O. World-wide acceptance of social insurance resulted in the development of fundamental principles and the adoption at international labour conferences of conventions aiming at greater unification of social insurance practice. By 1939, 19 countries had ratified the workmen's compensation (accidents) convention, and 16 the sickness insurance convention.

Workmen's Compensation Act

In Great Britain until 1946 social insurance was, as it remains in the majority of countries, divided into various branches—workmen's compensation, sickness insurance, pension insurance, unemployment insurance. Under the Workmen's Compensation Act, 1897, employers were made individually liable to pay compensation; insurance was optional except in coalmines, where special legislation passed in 1934 made it compulsory. All persons working under a contract of service or apprenticeship, except non-manual workers whose annual remuneration exceeded £350 and certain other groups of workers, were entitled to compensation for injury received in the course of their work. Benefits were given in case of incapacity and death; in case of partial incapacity, compensation was calculated as a percentage of earnings taking into account the difference between the worker's earnings before and after injury. The great majority of employers insured against their liabilities.

Compulsory health insurance was instituted by the Act of 1911, subsequently amended by Acts of 1926, 1928, and 1932. Insurance was compulsory for all employed persons aged 16 and upwards, with the exception of certain classes of non-manual workers and some other workers. The scheme was administered in the main through approved societies so far as sickness benefit was concerned, and by insurance committees as to medical benefits. Contributions were made by employers and the insured persons, and the state granted a subsidy. Insured persons were entitled to medical, sickness, disablement, maternity, and other benefits, on a flat rate.

Insurance did not enter into the old age pensions granted in 1909, but the Contributory Pensions Act, 1925, amended 1929 and 1932, related widows', orphans', and old age contributory pensions to compulsory insurance involving

contributions by employers and employees and a state subsidy.

Unemployment insurance, introduced by the National Insurance Act, 1911, extended by Acts, 1920–1933, and subsequent orders, made insurance against unemployment compulsory, with certain exceptions, for all persons between the ages of 16 and 65 who were employed under a contract of service or apprenticeship. Contributions were payable by employers, employees, and the state; benefits were on a flat rate.

This social insurance was supplemented by non-contributory old age and blind pensions, unemployment assistance, public assistance (replacing the old poor law), institutional treatment of disease, the lunacy and mental deficiency services, maternity and child welfare services, health services for school children, and special provisions as regards ship-owners' liability towards sick or injured seamen. In most countries such social assistance is the auxiliary of social insurance, and it has become an aim to integrate both into a single scheme. The main obstacle to such integration has been that, in most countries, social insurance has been related to certain classes of the population only, and is not national in character and coverage.

New Zealand's Lead

The first countries to introduce a system of comprehensive compulsory insurance for all members of the community—if we disregard the communist experiment in Russia—were New Zealand (1939) and Australia (1943). Their "income security schemes" were based partly upon a contribution from every resident to the cost of the scheme through a special income tax, thus differing from the schemes embodied in the National Insurance Acts, 1946, in Great Britain, based on the Beveridge report, 1942. That report aroused nation-wide enthusiasm. But before Beveridge's searching inquiry, royal commissions and parliamentary committees, private investigators, and courageous politicians like Sir Arnold Wilson (1884–1940) had raised their voices against the deficiencies of British social insurance: *e.g.* the low benefits, in particular under national health insurance; the exclusion of dependents from benefits granted to the breadwinner; the unequal benefits for equal contributions received through different approved societies; the overlapping

of insurance services and their high cost of administration; the evil of inadequate lump sum settlements under workmen's compensation, and the disturbing amount of litigation involved under industrial accident insurance; the exclusion of funeral benefit from statutory insurance (for burial insurance, the workers relied on industrial assurance, which has been severely criticised for its high expense ratio, its methods of canvassing, and the great number of lapsing policies); the inadequacy of medical treatment benefits under national insurance, which stood in sharp contrast to the general improvement in surgery and in methods of rehabilitation. Reform implied a radical change of method and a more comprehensive and more unified system of insurance, and the general application of the compulsory principle. This was the background against which the legislation that reached the statute book in 1946 was debated.

National Insurance Acts

That legislation consisted of two Acts, the National Insurance Act, 1946 (9 and 10 Geo. 6 Ch. 67), and the National Insurance (Industrial Injuries) Act, 1946 (9 and 10 Geo. 6 Ch. 62). The first provided unemployment, sickness, maternity, and widows' benefit; retirement pension, guardian's allowance, and death grant. The second provided insurance against personal injury caused by accident arising out of and in the course of a person's employment, and against prescribed diseases and injuries due to employment. [Medical treatment was covered by the National Health Service Act, 1946; rehabilitation, training, and resettlement of disabled persons by the Disabled Persons (Employment) Act, 1944.]

The benefits, paid at a flat rate, were considerably higher than under former schemes, and were supplemented by additional rights, *e.g.* increased benefit for children, increased benefits for adult dependents, unemployment and sickness benefit for persons over pensionable age. Expenditure on the scheme (benefits and administrative expenses) was estimated at £650,000,000 p.a. for the first years (of which £283,000,000 would be employers' and employees' contributions, £15,000,000 interest on existing funds); against £411,000,000 previously. The scheme covered the entire population of all ages, and of all occupations or none. Its aim was

expressed in the white paper on Social Insurance, part I: "In a matter so fundamental, it is right for all citizens to stand together, without exclusions based upon differences of status, function, or wealth."

To administer the scheme, the ministry of National Insurance was created by an Act of Nov., 1944, Sir William Jowitt being appointed first minister. The ministry began to function on April 1, 1945, taking over administration of existing social insurance schemes from the depts. previously concerned, and from the Home office duties connected with workmen's compensation. (It was amalgamated in 1953 with the ministry of Pensions to form the ministry of Pensions and National Insurance, *q.v.*)

The 1946 Act retained the principle of tripartite contributions by employers, employees, and the Exchequer. Contributions, payable to the national insurance fund, varied in scale for employed persons, employers, self-employed persons, and non-employed persons; the Exchequer supplement also varied similarly.

Industrial Injury Scheme

The industrial injury insurance scheme set workmen's compensation on a new basis, making it a genuine social service. It included benefits at special flat rates (with family supplements) paid from a separate state insurance fund, to which employer, workman, and the Exchequer contribute. Lump sum settlements were abolished except in some cases of minor disability. For the earlier weeks, while the workman is incapacitated for work, there are injury allowances at uniform rates, followed if disablement is prolonged by industrial pensions based not—as was the system under the old workmen's compensation law—on loss of earning capacity, but upon the extent to which the workman has suffered disablement by the injury, by comparison with a normal healthy person of the same age and sex. This pension is not affected by any subsequent earnings of the workman, a point regarded by the drafters of the Act as a cardinal feature of the scheme, since it removed the previous grievance that an improvement in the workman's earning capacity resulted in an automatic reduction of his compensation, a fact which frequently prevented partially disabled persons from resuming work as early as possible, and from undergoing

all possible rehabilitation treatment. The basic disablement pension under the Act was 45s. a week where the degree of disablement was assessed at 100 p.c., falling to 9s. where disablement was not more than 20 p.c. The industrial pension was supplemented by a special allowance if the pensioner was unemployable; and was subject to additions to cover family responsibilities, and, in special cases, treatment and attendance. Consult Approaches to Social Security, I.L.O., 1942; National Health Insurance, Hermann Levy, 1944; National Health Insurance in Great Britain, 1911-1946, R. W. Harris, 1946.

Insured Person. One compulsorily insured and entitled to benefits under certain British Acts of parliament. Such were the National Health Insurance Acts (replaced by the National Health Service Act, 1946), Unemployment Insurance Acts, and Widows' Orphans', and Old Age Pensions Acts, merged 1948 into one system under the National Insurance Act, 1946. The National Insurance (Industrial Injuries) Act, 1946, replaced the Workmen's Compensation (*q.v.*) Acts.

Intaglio (Ital.). A process of printing from hollows which have been engraved or etched out of a smooth surface, such as a metal plate. It is more familiarly known as photogravure (*q.v.*).

Integration (Lat. *integer*, whole). The inverse process to differentiating. An integral may be regarded as the summation of a series of consecutive values of a continuously varying quantity. The problem of finding the area of a space bounded by known curves may be considered as a problem in integration, since it can be solved by considering the summation of a number of small areas. See Calculus; Function.

Intellect (Lat. *inter*, between; *legere*, to choose). Term denoting the cognitive faculties of the mind, the capacity of knowing. These faculties include perception, memory, and judgement, but exclude sensation. According to the Scottish school, intellect was equivalent to common sense (*q.v.*). Earlier philosophers, *e.g.* Locke, used the word understanding in preference to intellect. Intellection signifies a process, the exercise or activity of the intellect. See Metaphysics.

Intellectualism. In philosophy, the theory that the true nature of things can be learned only by the light of pure reason, not by sensual perception or intuition. In ethics,

intellectualism is the theory that the fundamental laws of morality have their source in reason; thus Socrates regarded virtue as something that could be taught. The word also means an excessive devotion to intellectual pursuits. See Philosophy.

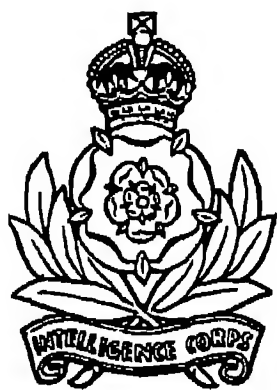
Intelligence (Lat. *intelligere*, to understand). Term used for the power of comprehending, digesting, and evaluating experience. It is closely linked with memory, attention, and curiosity, and has been defined as "the ability of an organism to solve new problems, to meet novel situations by improvising adaptive responses." The seat of the intelligence is in the pre-frontal lobes of the hemispheres of the brain which are much more highly developed in man than in any other animal.

Intelligence is an inborn capacity of the individual. The intelligence potential cannot be increased, though by training and education it can be made much more effective. Although it may not be fully utilised owing to lack of training or as a result of emotional disturbances, it is believed that the intelligence level is not lowered except as a result of damage to the brain by disease or injury.

Intelligence appears to be inherited; but the genetic basis is very complex and the way it operates is not fully understood. Children tend to have the same level of intelligence as their parents; but there are frequent exceptions, especially if one parent is more intelligent than the other, and different children of the same parents sometimes differ markedly in the level of their intelligence. Where both parents are dull or mentally sub-normal the children are almost invariably of similar or lower intelligence. On the other hand, none of the children of two exceptionally intelligent parents may have an equal level of intelligence with their parents.

Intelligence, MILITARY. Collection and interpretation of information collected by army, navy, and air force intelligence officers regarding an actual or potential enemy and the appreciation of its military value; also the denying of similar information to an actual or potential enemy. In Great Britain intelligence departments are attached to the three fighting services of the crown; the intelligence division at the Admiralty deals with naval intelligence; there is a director of intelligence at the Air ministry;

and the Intelligence Corps is responsible for supplying information to the War office. The Intelligence Corps was formed during the First Great War, but its members were then regarded as staff officers and did not wear any distinctive badge. In July, 1940, the corps became a separate unit with its own cap badge, a crown surmounting a rose, emblem of security, resting on a laurel wreath, representing military achievement, and a green shoulder flash.



Intelligence Corps badge

Espionage and military intelligence are very closely linked; the first involving the collecting of information, the second its interpretation. For example, during the Second Great War an officer of the Intelligence Corps, Col. Scotland, served in the German army in order to secure information about the enemy's morale and dispositions.

Intelligence Services in Peace Time

In peace time the intelligence branches collect information regarding the counterparts of their services in foreign countries, and devise means whereby, in the event of war, all essential details concerning the enemy's strength in men and equipment and his probable strategy and tactics can be placed at the disposal of commanders in the field, on the sea, and in the air. Information which can readily be collected in peace time includes such details of other countries' military potential and organization; strength and power of expansion, defence works and fortresses; road, rail, water, and air communications; telegraph, cable, and radio systems; economic and industrial resources in relation to military requirements; and the characteristics of military leaders, together with forecasts of their probable tactics and strategy in the event of war.

During a campaign, intelligence services are expanded, and while every effort is made to keep information up to date, equally energetic measures are initiated to baulk the enemy's intelligence service. Intelligence units specially trained to note and interpret any details which may reveal new enemy weapons, tactics, or formations accompany the fighting services on operations. Aerial photographic reconnaissance is of

great importance, the interpretation of aerial photographs requiring special skill and training. Air crews returning from an operation report their observations; so do submarine and other naval commanders and military scouting parties. Prisoners are skilfully interrogated; captured documents are examined; radio signals are intercepted and interpreted; the neutral and enemy press is studied.

In the Second Great War, military intelligence on both sides sometimes failed of its purpose. For instance, the British were in many respects badly informed as to Germany's actual military strength and plans of strategy, while their interpretation of much of the accurate information in their possession was ignored by the govt., with disastrous results in France and Norway, while German intelligence failed to realize the full implications of radar (the radar watch maintained round Britain materially assisted the numerically inferior R.A.F. to defeat the Luftwaffe in the Battle of Britain), or the strength and recuperative capacity of the Soviet armies, and failed also to anticipate the time and place of the Allies' two major invasions, those in N. Africa and Normandy.

Notable achievements of British military intelligence during the Second Great War were the securing of details of the flying bomb nearly two years before the first one was launched against England; the interpretation of details of the German Tiger tank, resulting in the production of the 17-pounder gun to meet it; and early knowledge of the radio-controlled torpedo boat.

Intelligence Test. Method of measuring intelligence. The problem of defining "intelligence" continues to cause difficulty in any explanation of the use of intelligence tests, partly because "intelligence" has several meanings in ordinary speech, and also because psychologists themselves, although they must be more specific, find they cannot adhere to one rigorously exclusive concept; but the meaning which psychologists are most inclined to use is that of native wit, the capacity to think and to solve problems. The purpose of the intelligence test is to measure this capacity in a way which does not confuse it with education, previous experience, and special aptitude. It is directly concerned with the innate ability to learn. The

possibility of assessing this capacity was suggested by Galton in his "Enquiries into Human Faculty and its Development," 1883, but the first practical step to meet a need was taken at the beginning of the 20th century in Paris, when the educational authorities began to consider setting up special schools for those who could not respond to the ordinary curriculum. The problem was to sort out those who did not have the capacity to learn from those who were described as "merely lazy." By setting tasks successively to groups of children of different ages, Alfred Binet and Theodore Simon learned what was the normal achievement of the 6-year-old, the 7-year-old, and so on, and evolved the Binet-Simon tests of intelligence, performance in which provided the basis for measuring the individual child. A child who could attain the norm of the 8-year-old had a mental age of 8 years, but a child of 12 who could attain only the norm of a child of six had a *mental age* of six years. Later investigators adopted the method of expressing the ratio of the mental age to the chronological age as the child's intelligence quotient, or I.Q. Thus, a child aged 6 years who attained the norm of the 8-year-old had an I.Q. of $\frac{8}{6}$ or 133 p.c.; a child aged 10 years who could attain only the norm of the child of 8 years had an I.Q. of $\frac{8}{10}$ or 80 p.c.

Many investigators have continued the work of Binet and Simon, and investigations still go on. Well known intelligence tests are Stanford revision (of the Binet), Otis, Cattell, Ballard, Terman-Merrill, and the Alexander performance scale.

Intelligence tests have been used to assess the capacity of a child to benefit from a particular curriculum and so to choose the type of secondary school (grammar, technical, or modern) most suited to him or her; and to discover special aptitudes, i.e. types of proficiency attainable with not more than the average difficulty, and thus to deduce the most promising avenues for specialisation either in study or in employment.

Many kinds of test have been devised. Their aim has been to measure only some aspects of intelligence, e.g. power to understand words and symbols; response to instructions, suggestions, warnings, etc.; capacity to perceive differences, similarities, contrasts, or the complementary nature of ideas, shapes, colours, etc.

Intelligence tests have been prepared for people who cannot read, and have been applied to the assessment of character, temperament, sense of right and wrong, social sense, and physical reactions.

In the Binet-Simon tests and their derivatives the problems were all put in verbal terms. A typical word intelligence test set to children of 11 years is:

- In each of the sets of words below one word means something rather different from the other three. Find that one word and underline it—*example*: herring, cod, *pork*, salmon:
- (a) piano, violin, drum, banjo;
 - (b) herd, flock, pack, crowd;
 - (c) road, tram, train, car;
 - (d) here, there, when, where;
 - (e) strong, vigorous, health, energetic—(up to 32 sets).

But no matter how simply the questions in a verbal test are put, some element of dependence on education cannot be eliminated. Psychologists and educationists therefore developed also non-verbal tests in which literacy played no part, *e.g.* the Goddard form-board (a board out of which pieces of various shapes—stars, squares, etc.—have been cut; the test is to fill the empty spaces with the correct pieces), the Heely picture-completion test, Koh's blocks, the Penrose-Raven matrices.

First experiments in the use of intelligence tests were concerned with children, but it became apparent that such tests could also be usefully applied to adults. The first mass application of intelligence tests to adults was in 1917-18, when nearly two million recruits to the American army were tested. Highly developed intelligence tests were used by the British, German, and American armies in the Second Great War. The British army used them as part of a comprehensive scheme, in which many other kinds of psychological tests were used, for the selection of men for army duties and for commissions. They were also used as an aid to psychiatric diagnosis. But it came to be recognized that too much reliance cannot be placed on any formal test in estimating an individual's potentialities and capacities, and especially in determining a child's capacity for independent social adaptation, since many other factors, such as temperamental predisposition and emotional stability, are involved.

Intelligentsia. Term for that section of a population to which culture, intelligence, and advanced

political views are attributed. The word came into use in Russia in the 1860s through P. Boborikin, and occurs in English in a translation of L. Tikhomirov's *Russia, Political and Social*, by Edward Aveling, 1888. Maurice Baring used it several times in his *The Russian People*, 1911; and H. W. Williams devoted a chapter of his *Russia of the Russians*, 1914, to the intelligentsia.

Intendant (Lat. *intendere*, to apply the mind to, take care of). Name given in France before the Revolution to certain high officials. They first appeared in the 14th century, being then concerned with collecting the royal revenue, and later they were in charge of the department of finance. Intendants of the various positions were first appointed by the king about 1580, and although at first temporary, they became permanent. Gradually they obtained additional powers until in the 18th century they were superior even to the governors.

Intensifier. Device used as an alternative to, or in conjunction with, an hydraulic accumulator for increasing the initial pressure of a constant hydraulic supply. By means of the intensifier, pressures up to five tons per sq. in. can be obtained from any initial pressure. In photography, an intensifier is a reagent whose application under given conditions increases the density of a negative, and consequently its printing value, or the depth of an image on bromide or other sensitised paper. See Accumulator; Hydraulics.

Intensive Cultivation. Methods of forcing vegetables and salads. Formerly, this was done by planting in rich soil containing large quantities of manure, under cover of bell-glasses and frames—a method which lapsed because of the increasing difficulty of obtaining manure. The plan now adopted is to use cloches which protect the crops in winter and hasten their growth, and to keep the soil fertile with moderate quantities of manure and fertilisers. Another practice is cultivating early crops in garden frames placed on hotbeds of fresh manure or a mixture of that and dry leaves. These methods are of value chiefly from late autumn to spring for production of vegetables and salads out of season. In market gardens cloches have superseded the old bell-glasses.

From seeds sown in Aug.-Sept. and again in Jan., on soil placed on hotbeds in frames, small carrots, radishes, and lettuces are raised.

The roots of asparagus, sea kale, rhubarb, and chicory can be forced likewise. The usual method of heating soil in garden frames is by electric cables. Germination of seeds sown out of doors in spring, *e.g.* spinach, beans, peas, and lettuce, is hastened by cloches. Gardeners use borders near south-facing walls for the earliest vegetables, and by covering these with frames and cloches bring them to maturity much more quickly than others in the open garden; this practice, allowing of more crops than usual being grown on a given site, intensifies the yield from the garden. Intercropping means that vegetables which mature quickly, *e.g.* lettuce, spinach, radish, are sown between rows of others that are slow.

Intention. In English law it is a maxim that the intention is to be regarded rather than the form. But in construing legal documents the court must always deduce the intention from the words of the document. If the language is clear, no one will be allowed to say that something else was intended. If there is an obscurity, in certain cases evidence may be adduced to show the meaning. Thus, where a testator bequeaths a legacy "to my niece Margaret," and he has two nieces of that name, it would be proper to allow evidence to show that he always spoke of one as Margaret and the other as Maggie.

Interbourse. Term meaning international in the financial sense. Interbourse securities can be bought or sold with equal ease on the stock exchanges of London, Paris, New York, and elsewhere. See Stock Exchange.

Intercalary (Lat. *intercalare*, to insert). Term for days (or months) officially inserted in the calendar at any period, chiefly in order to bring the lunar year into correspondence with the solar year. (See Calendar.) The term intercalary is also used biologically for something intermediate between two types; botanically for a special form of growth in fungi and algae; geologically for a layer of different kind occurring between the regular strata.

Interdict (Lat. *interdicere*, to forbid). Term used for an ecclesiastical punishment imposed by a pope, bishop, or other prelate. A general interdict is when all public worship, burial services, and the administration of the sacraments are forbidden; such was that laid upon England in 1208 by Pope Innocent III. A local interdict is

when a diocese or parish is similarly punished. The corresponding punishment for an individual more usually takes the form of excommunication. Even from general interdicts some exceptions were recognized, and none was ever completely enforced. (See Excommunication.)

In Scots law an interdict is a judicial order forbidding certain proceedings. It corresponds to the English injunction (*q.v.*).

Interest (Lat., it is between). In finance, money paid for the loan of money; payment for the use of capital; share of the product accruing to the owner of the capital used. More generally, it is a share in a property or undertaking, *e.g.* a quarter interest in a ship. One has an insurable interest in a person or thing if one would lose by the occurrence of the event insured against, *e.g.* the death of the person or the damage of the thing. An interest charge is normally expressed as a percentage per annum; interest at 5 p.c. per annum means a charge of £5 for the use of £100 (or £100 worth) for one year. Hence the interest on £350 at 5 p.c. per annum for three months would be $£3\frac{1}{2} \times \frac{3}{4}$ (since three months is $\frac{3}{4}$ year). Simple interest on $£p$ (the principal) at r p.c. for t years is $\frac{£prt}{100}$.

The difference between simple and compound interest (usually reckoned for periods greater than one year) is that when money is lent at compound interest, the sum accruing for one period (year, half-year, or quarter) is added to the principal in order to calculate the interest during the next period. Thus at 5 p.c. per annum, the first year's interest on £100 would be £5, but the second year's interest would be 5 p.c. of £105. Annuities, leases, and endowment assurance policies, etc., involve compound interest. Bank rate is the rate per cent per annum of interest at which the Bank of England will make loans on first-class security to people other than its regular customers.

The rate of interest on money can be assumed to include the price paid (*a*) for the use during an agreed term of another's money or purchasing power; (*b*) for the risk that the money will not be repaid; (*c*) sometimes for the risk that the money when repaid will have less purchasing power than it had when the loan was made, prices having risen; (*d*) sometimes for the lender's forgoing

opportunities of using the money profitably. Because (*b*), (*c*), and (*d*) vary considerably in individual transactions, rates of interest charged may range from, say, $\frac{1}{2}$ p.c. per annum offered by banks on time deposits to 1d. in 1s. per week, *i.e.* 433 $\frac{1}{3}$ p.c. per annum, charged by some money-lenders. (Under the Moneylenders' Act, 1927, a rate of 48 p.c. per annum may be charged.)

Interest on money invested in the equipment and materials employed in the production of a commodity is included by the accountant as a cost of manufacture or of sale; hence interest affects the price at which a commodity tends to be offered for sale.

HISTORICAL. Among the Romans interest was primarily special compensation paid by a borrower who was unable or unwilling to repay the principal. *Usura* denoted interest paid for the use of money borrowed. From this comes the word usury, now applied only to excessive or harsh interest rates.

Morality of Interest and Usury

The morality and the economic significance of interest and usury have been discussed through the ages. Numerous passages in the O.T. forbade it among the Israelites; Plato, Aristotle, Virgil, and Plutarch condemned it; in the 8th century it was forbidden in England; the prohibition was repeated in the 12th, 13th, even the 14th century. The Christian Church taught that money was barren and interest was therefore extortion; those lending to the unfortunate should do so as an act of charity. Later a distinction was made between lending money or goods for profit-making and lending for personal use: the former entitled to interest, the latter did not.

Most loans in early and medieval times, however, were to the nobility for personal expenditure and to the crown for waging war. Such lending was permitted only to the Jews, who were protected by the king but whose reserves he sometimes raided. In 1545 Henry VIII legalised interest up to 10 p.c. This maximum was reduced to 8 p.c. in 1623, to 6 p.c. in 1651 and again in 1660, and to 5 p.c. in 1713. Not until 1854 were all restrictions removed. The Moneylenders' Act, 1900, empowered the courts to adjust contracts involving excessive interest charges. It is generally thought that the legal maxima established at different times were often exceeded.

The changed attitude towards interest reflects the development of economic organization. Whilst loans were made almost wholly to the unfortunate or the profligate, usury was condemned. As opportunities grew for productive employment of resources, a distinction developed between interest and usury. The former became respectable and customary as the lender's share of the profit of the enterprise made possible by the loan. With the growing complexity of industry, commerce, and politics, the distinction between productive and unproductive loans became blurred. Invention and discovery made necessary huge aggregations of purchasing power to provide buildings and equipment, and eventually lending and investing were distinguishable only by the terms of the contract. The principal difference is that the lender (*e.g.* debenture-holder) is entitled to interest and repayment of his loan irrespective of the success of the enterprise, while the ordinary investor or shareholder is entitled only to interest (included in his dividend), variable with the success of the enterprise, and not to repayment of principal until the company is wound up.

Interest has been variously explained by economists. It has been regarded as (*a*) the value of the money in use; (*b*) the reward of abstinence, *i.e.* refraining from spending; (*c*) the expression of the individual's greater valuation of the present than of the future; (*d*) the price of the productive service of the capital that the money supplied will buy; (*e*) the wages of the labour which produced the purchasing power lent; (*f*) (by Marx) the result of taking part of the labour of others; (*g*) (by Keynes) the measure of the unwillingness of those who possess money to part with their liquid control over it: "the reward of not hoarding."

Keynes and Control of Interest

Keynes distinguished between the interest of money and the interest of other commodities, considering that money has inherent qualities which tend to keep the rate of interest on it unduly high compared with that of other commodities. In consequence, "a wise government is concerned to curb it" (the rate). He thought controls necessary to bring about an adjustment between the propensity to consume, the inducement to invest, and the tendency to hoard. He prophesied the gradual extinction of the class

living on unearned income received from investment. Keynes's teaching had a great effect on British financial policy from 1925. See Banking; Capital; Compound Interest; Moneylender; consult Principles of Economics, A. Marshall, 1895; General Theory of Employment, Interest, and Money, J. M. Keynes, 1936.

H. Watson, B.Sc.

Interest Table. Columnar arrangement showing the effect on £1 (or £1 per annum) of the addition of simple or compound interest for various periods at different rates. Simple interest is generally reckoned for periods of less than one year, and a table normally states the interest on £1 at various rates p.c. for a number of days. Interest tables are particularly useful in calculations involving compound interest for a number of years, in connexion with annuities, the valuation of leases, securities, etc.

Compound interest tables may show: (a) the sum to which £1 will amount at the end of various years at various rates; (b) the present value of £1 receivable a stated number of years hence; (c) the amount derived from putting in £1 per annum for a stated number of years; (d) the present value of £1 per annum for a stated number of years; (e) the annuity which can be bought for £1 paid now. Such tables are of great value to actuaries.

Interfacial Tension. Molecular tension existing at the interfaces (or adjacent surfaces) of any two immiscible liquids. Oil and water do not mix, but it is often desirable to bring about an emulsion of the two. One practical application is the use of soaps or detergents, which enables dirt and grease to be washed away from clothing, etc. The soap molecule, or that of the modern detergents which chemists have synthesised, is peculiar in that it may be compared to a short rod, at one end of which is a fat-soluble portion and at the opposite end a water-soluble portion. If soap or detergent is introduced into a watery fluid on which is a greasy film, some molecules of the introduced substance align themselves across the interface between the grease film and the aqueous solution, and tend to attract the oil molecules down into the water. The interfacial tension is lowered and mixing becomes possible. See Colloid; Detergent.

Interference (Lat. *inter*, between; *ferire*, to strike). In

physics, the action at a point when two or more wave motions combine, the effect produced being dependent on their wavelengths, amplitudes, and phases. It is assumed that each wave system exerts the same effect as if the other motions were absent, so that the actual displacement of any particle in the path of the waves is the sum of the displacements it would sustain from each set of waves acting separately.

Imagine that two similar waves are travelling over water and that at a particular place and instant their crests coincide. According to the principle of superposition, the height of the combined wave will be doubled: this is termed constructive interference. But if the crest of one wave coincides with the trough of the other, the surface at that point will remain undisturbed, and destructive interference is said to occur.

The phenomenon of the interference of sound waves may be illustrated by means of a vibrating tuning fork held in the hand at ear-level and gradually rotated. Marked regions of constructive and destructive interference will be noted, due to the mutual action of the sets of waves sent out by each prong.

The alternate dark and bright bands observed in optical interference experiments are known as interference fringes. The brilliant colour effects of thin films of oil on a wet road are due to interference between light directly reflected from the upper surface, and the part of the incident wave which was transmitted at the upper surface and has suffered one or more internal reflections at the lower interface before emerging into the air at the upper surface.

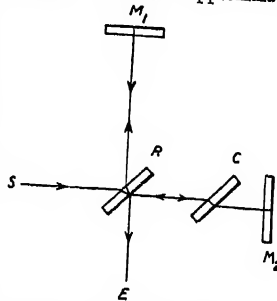
In radio, interference means the reception of unwanted signals by a receiver. When the receiver is tuned to a particular transmitting station it is not completely isolated from the influence of other stations. If the receiver is near a local transmitter, interference may be brought about by currents induced in surrounding wires.

In television, interference usually takes the form of a rain of white spots or flecks across the screen. It can often be reduced by fitting a suppressor to neighbouring electrical machinery or to motor car engines.

Interferometer. An optical instrument for measuring small distances in terms of a known wavelength of light or of the wavelength of light in terms of a

standard of length. It can determine the refractive indices of gases, and its high sensitivity for this type of measurement allows detection of small quantities of poisonous gases in the atmosphere.

One form of interferometer, the Michelson, is illustrated in the diagram, the essential features being two plane mirrors M_1 and M_2 and two identical and parallel glass plates R and C. R is lightly coated with silver on its back surface so that approximately



half the incident light is reflected to M_1 and the other half is transmitted to M_2 . The compensating plate C is included so that the two optical paths followed by the original beam after incidence on R contain the same thickness of glass. If the distances from R to M_1 and M_2 are exactly equal and if M_1 and M_2 are perpendicular to one another and at 45° to R, then the two beams will arrive in phase at E and constructive interference will take place.

Where adjustment is not exact, a system of interference fringes will be observed. A displacement of M_2 , say through one half wavelength, causes each fringe to move into the position occupied by an adjacent fringe. If n successive dark (or light) fringes are counted as M_2 is moved through a distance d , then

$$d = n\lambda/2 \text{ or } \lambda = 2d/n$$

where λ is the wavelength of the light. S indicates the source of light and optical system to produce the incident parallel beam.

Interglossa. Plan for an international language devised by Lancelot Hogben. Its word material is based on roots, mainly Greek, internationally current in science, and its grammar is reduced to a minimum. The vocabulary contains some 10,000 words. Consult Interglossa, L. Hogben, 1943; English-Interglossa Dictionary, D. Baker, 1943.

Interim (Lat., meanwhile). A word for temporary decrees of a ruler. It was chiefly used during

the time of the Reformation to embody a temporary settlement of religious matters. A notable example is the Augsburg interim of 1548. *See* Reformation.

Interior, MINISTRY OF THE. Department of government in various countries; it corresponds roughly to the home office of the U.K. The interior department of the U.S.A. is headed by a secretary who is a member of the cabinet. It was established in 1849.

Interjection (Lat. *inter*, between; *jacere*, to throw). Sound or word expressing emotion or passion. The interjection belongs to the earliest stage of language, and is the result of involuntary movement of the organs of speech. Grammatically it stands apart from a sentence. Examples are Oh! and Pooh! *See* Language.

Interlaken. Town and summer resort and tourist centre of the Bernese Oberland, Switzerland. On the Aar, between lakes

engrossed or fairly written out for execution, or after it has been executed. Unless interlineations are initialled or otherwise noted as having been made before the deed was executed, they render a deed void.

Interlocutor (Lat. *inter*, between; *loqui*, to speak). Word meaning literally one who takes part in a dialogue or conversation. In Scots law, an interlocutor is strictly an interim judgement before the final decision, but in practice is extended to include any order. In English law, interlocutory proceedings are proceedings before the trial of the action.

The name interlocutor, or Mr. Interlocutor, was given to the compère of the once-popular negro minstrel entertainment. In the "sit round" his place was in the centre, the two extremities of the semi-circle being occupied by "Mr. Bones" and "Mr. Tambo," who addressed their interjections

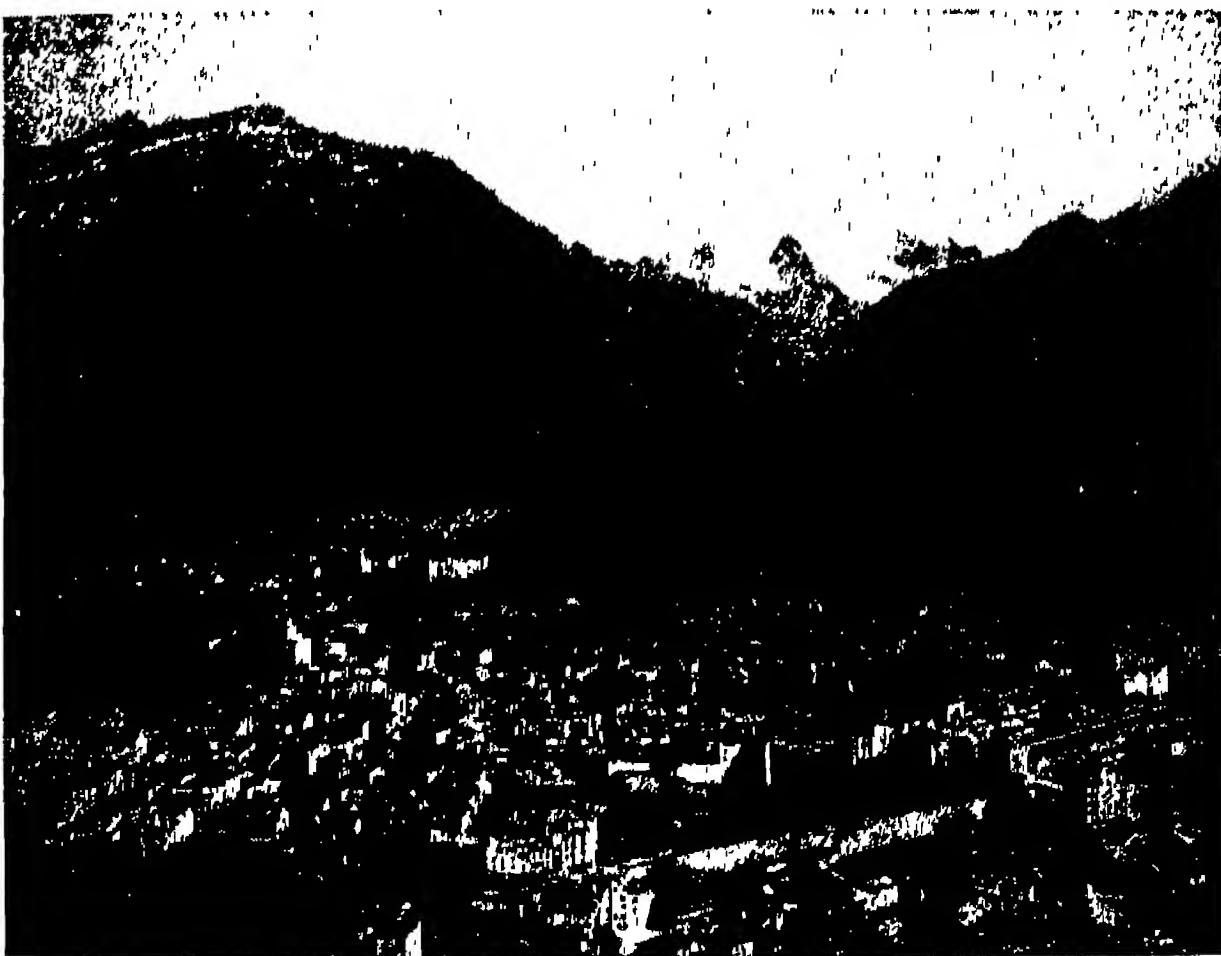
e.g. the rustic performance in Shakespeare's *Midsummer Night's Dream*. *See* Drama; Mystery.

Intermarriage. Marriage between persons belonging to the same family or tribe. The word is particularly applied to the union of persons related to each other by ties of consanguinity and affinity which have been regarded as bars to marriage under various systems of law. The old canon law forbade as incestuous marriage between persons related within the seventh degree of consanguinity and affinity and declared the offspring bastard. English law allowed the canon law to denounce marriages as incestuous and impose ecclesiastical penalties, but refused to acknowledge its power to bastardise the issue, and in 1547 an Act authorised all marriages allowed by the Levitical law. Similar restrictions obtain in Scots and French law.

The table of kindred and affinity in the Prayer Book sets forth the degrees of relationship within which marriage is prohibited by the Church of England. It was put forth by Archbishop Parker in 1563 and adopted by the 99th canon of 1604, and remains the authoritative list of the Church of England and also of English law, save that by Acts of 1907, 1921, and 1931 a man may marry his deceased wife's sister, his deceased brother's widow, his deceased wife's aunt or niece, his deceased uncle's or nephew's widow. A clergyman is liable to ecclesiastical censure if he conducts a marriage within prohibited degrees.

Intermediate State. Condition of being of the soul between death and its final destination. The parable of the Rich Man and Lazarus and other passages teach that the souls of the righteous pass into a state of peace and happiness, while those of the wicked are in a state of misery. But the use of the terms Hades and Paradise for this state implies that it is something different from heaven and hell; and all information about the Second Advent of Christ, the resurrection of the dead, and the final judgement goes to show that the present state of the departed is not final. *See* Immortality; Purgatory.

Intermezzo (Ital.). In music, an interlude or entr'acte. The term is frequently applied either (a) to an instrumental piece designed to fill up the time while necessary changes are being effected on the stage, or (b) to an independent composition of small



Interlaken, Switzerland. The hill on the left is the Schnige Platte. The snow-covered peaks in the background are the Monch (left) and Jungfrau (right). The gorge in the centre leads, right, to Lauterbrunnen, and, left, to Grindelwald

Thun and Brienz, at an alt. of 1,860 ft., it is 17 m. by rly. S.E. of Thun, with which it has also steamer connexion. It commands magnificent views of the Jungfrau and neighbouring mountains. Interlaken grew up round a monastery founded in 1130 and suppressed in 1528. Parts of its old church are now used for French Protestant, R.C., Anglican, and Presbyterian services. The castle, added in 1750, is now occupied by cantonal offices. There is also a kursaal. Pop. 9,000.

Interlineation (Lat. *inter*, between; *linea*, a line). In English law, any written matter inserted in a document after it has been

to him as to a chairman. *See* Christy Minstrels.

Interlude (Lat. *inter*, between; *ludus*, play). Name given to early plays from the time of the morality plays onward to the full development of the drama in the Elizabothan age, especially to plays performed by professional actors. The moralities are themselves frequently referred to as interludes, as in *The Goodly Interlude of Nature*, *The Interlude of Youth*, and others. The name is supposed to have arisen from the plays being occasionally performed in the intervals of banquets and entertainments. It was also used to designate a play within a play,

dimensions. Originally, however, it designated a dramatic piece of light character played between the acts of a more serious drama or opera, partly for the sake of relief, partly to rest the performers. Such an intermezzo had no connexion with the play. The ballet in an opera is really an intermezzo introduced more or less arbitrarily. The intermezzo, which is centuries old, eventually developed into the opera buffa. See Ballet; Opera.

INTERNAL COMBUSTION ENGINE

A. T. J. Kersey, M.I.Mech.E., Consulting Engineer

The principle upon which the internal combustion engine works is here explained, and some indication given of its diverse purposes. See also Aero-Engine; Aeroplane; Diesel Engine; Gas Turbine; Motor Vehicle; Oil Engine

The advent and rapid development of the internal combustion engine as a reliable source of power, both in small and large sizes, has had an enormous influence on the extension of transport by land, sea, and air. Its convenience for quick starting up from cold, transport and easy storage of fuel and absence of stand-by losses, together with the economical fuel consumption of the compression-ignition type at loads varying from half to full power, has led to the displacement of the steam engine from many fields. It is now in general use for farm tractors and other agricultural appliances, cement mixers, portable air compressors for pneumatic drills, excavators, cranes, etc., and has exercised a profound influence on warfare.

In an internal combustion engine the combustion of the fuel and

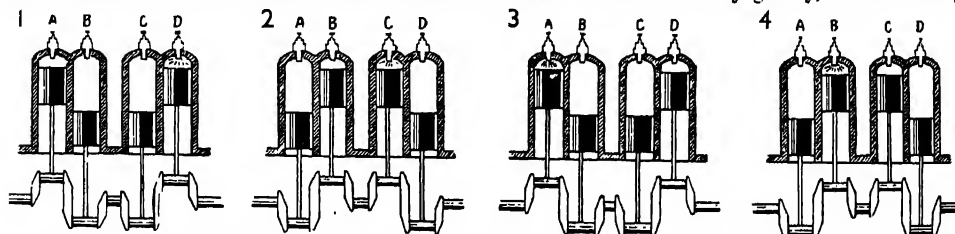
Intermittent Claudication. A condition in which severe pain comes on in one or both legs while walking. Occurring in elderly men and aged horses, it is due to degenerative changes in the arteries, resulting in a poor supply of blood to the muscles. Cramp then arises from lack of oxygen supply to the local tissues. The outlook for recovery is poor. This condition was probably Sir Walter Scott's complaint.

consequent generation of heat takes place inside the engine cylinder, so that no part of this heat is wasted before it reaches the engine. Very high temperatures, however, are generated in the combustion space and losses of heat occur to the water jacket or cooling fins and in the high temperature exhaust gases, so that, but for the fact that the cycle of operations is inherently more efficient than that of the steam engine or steam turbine, these losses might outweigh the advantages of internal combustion.

In actual practice the reciprocating steam engine converts from 5 p.c. to 20 p.c. of the heat of the fuel to useful work. The higher efficiencies can be maintained only by careful attention to the boiler and condenser and fall appreciably with reduction of load. On the

other hand, later internal combustion engines of the compression-ignition type convert 30 to 35 p.c. of the heat supplied to useful work, and this percentage can be increased appreciably by use of some of the heat in the exhaust gases for generating steam or driving exhaust turbines.

Internal combustion reciprocating engines can be roughly divided into two main classes: (1) those in which the fuel (gas or petrol) is mixed with air before admission to the cylinder; (2) those in which air only is admitted during the induction stroke, the fuel (heavy oil) being injected in the form of a fine spray at or near the end of the compression stroke. In the first class the fuel must be either gas or a liquid which is easily vaporised at ordinary temperatures, and compression pressures must not be so high that pre-ignition occurs. Ignition is by spark, and in the case of a petrol engine a carburettor device is required. The carburettor is required to vary the supply of petrol with the flow of air so that an approximately constant mixture strength is maintained. In engines for motor vehicles the speed of revolution of the engine and degree of throttle opening may vary within wide limits and the complications of later carburettors are designed to cope with such variations in addition to providing rapid acceleration when required. In the case of aero engines the engine speed does not vary greatly, but the density

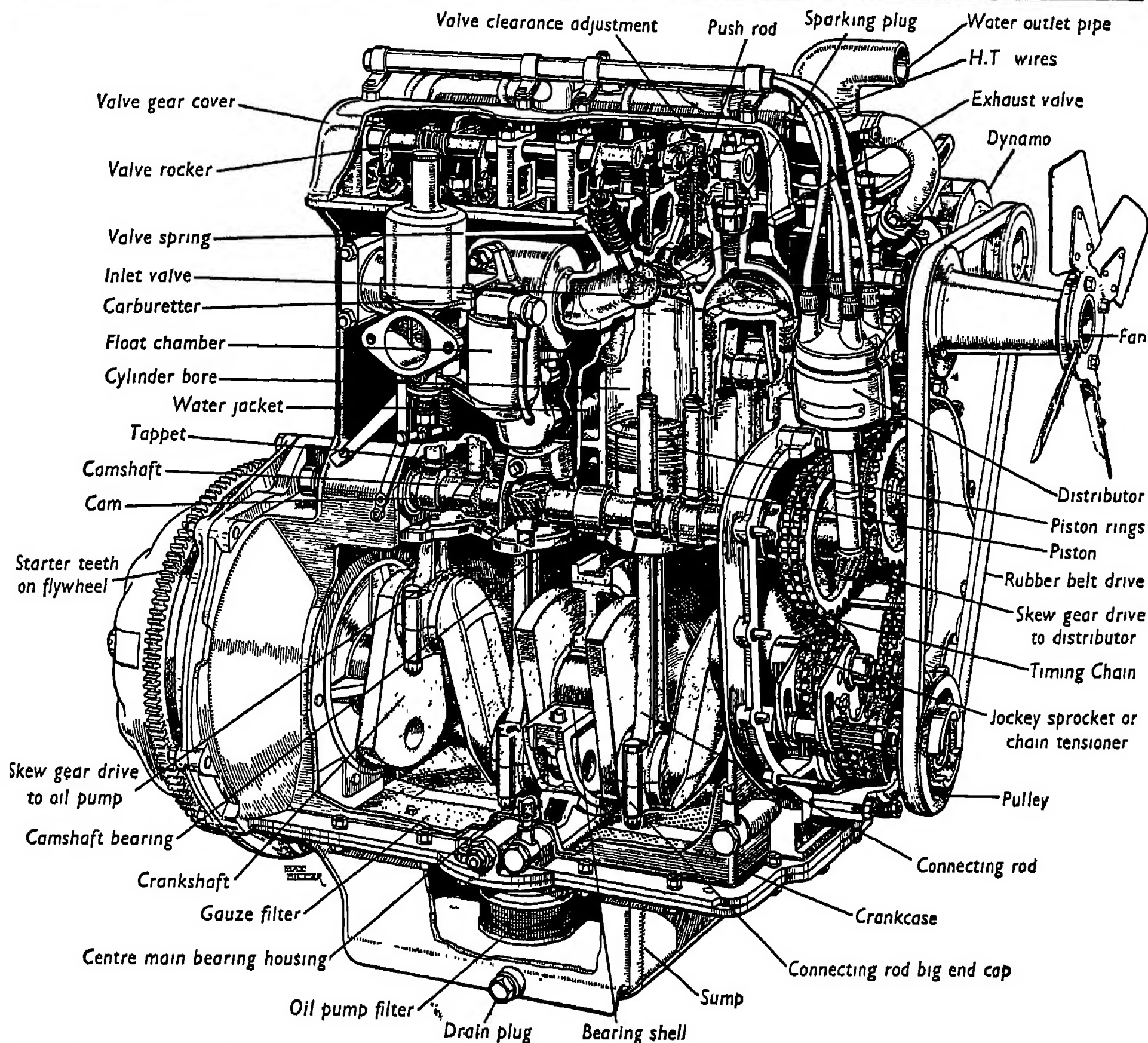


The diagrams show in a simplified form the following sequence of operations in a four-stroke engine: suction during the first downstroke of the piston; compression of the mixture of petrol vapour during the following upstroke; ignition of the compressed mixture at the dead-point, or top of the cylinder, and subsequent expansion of the exploded gases inducing the next downstroke; and expulsion of the burnt gases during the next upstroke.

In Fig. 1, the pistons have been set in motion by an initial turn of the crankshaft, either by hand or by self-starter. Piston A has started to move downwards in its cylinder, and as it does so a port, or valve, opens, enabling it to draw into the cylinder by suction a small quantity of air and petrol which has been vaporized by the carburettor. This is called the intake stroke. In Fig. 2 piston A has reached the bottom of its intake stroke and the gas inlet valve is closed. Piston A then starts to move upward, compressing the explosive mixture into a very small space, as in Fig. 3, when an electric spark, induced by the magneto, jumps across the contacts of the spark gap and ignites the

compressed and explosive mixture to create a rapid and violent expansion of the gas. The explosion drives the piston downwards, and gives a turn to the crankshaft. As piston A in Fig. 4 completes its downstroke and begins to move up again, an exhaust valve in the cylinder opens, and the face of the piston pushes the burnt gases into the exhaust, whence they are dissipated into the air. These operations are repeated by each of the four pistons in turn thus: in Fig. 1 suction starts in piston A, exhaust in piston B, compression in piston C, ignition and working stroke in piston D; in Fig. 2 compression starts in piston A, suction in piston B, ignition and working stroke in piston C, exhaust in piston D; in Fig. 3 ignition and working stroke starts in piston A, compression in piston B, exhaust in piston C, suction in piston D; in Fig. 4 exhaust starts in piston A, ignition and working stroke in piston B, suction in piston C, compression in piston D. The downstroke of one piston always initiates the upward stroke of another, the revolution of the crankshaft being converted into linear movement.

INTERNAL COMBUSTION ENGINE: DIAGRAM SHOWING IN PRINCIPLE HOW IT WORKS



The diagram shows a Riley 4-cylinder engine, viewed from the right-hand side and illustrating the compactness of the car's power unit. Notable features include the overhead valves operated by push-rods and rockers, and the skew gear drive

to the oil pump. Lubrication is by a large-capacity oil pump which draws filtered oil from the sump and delivers it at high pressure to the main bearing and camshaft bearings, the rocker gear, and the big ends. The engine is rated at 12 h.p.

INTERNAL COMBUSTION ENGINE: CUTAWAY DIAGRAM SHOWING ITS PARTS

Courtesy of "Autocar"

of the air supply will vary with altitude. Economical fuel consumption is also of much greater importance, so that, even when boosting is used, the carburetter has to satisfy different requirements and in fact is of quite different design. In Germany and later in the U.K. considerable success has been obtained with the injection of the volatile fuel directly during the induction stroke, thus substituting a fuel pump for the carburetter. Accurate metering of the volatile fuel and adequate vaporisation during the induction and compression strokes are main problems in this case.

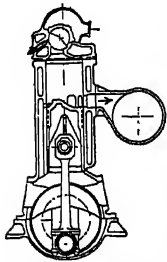
In the second class the air is compressed to a sufficiently high pressure and consequent temperature for self-ignition to take place when the fuel is injected into the combustion space, so that no

special ignition device is required. Sufficient turbulence, or swirl, to ensure mixing of the air with the atomised fuel is necessary to ensure rapid and complete combustion. Injection of the fuel by compressed air (the original Diesel cycle) is obsolete, and the fuel is pumped through a nozzle at a pressure of from 2,000 to 10,000 lb. per sq. in., the higher pressure being required to give sufficient penetration with large cylinders. Power is regulated by varying the amount of fuel injected, and there is no necessity for throttling the air supply, so that the volumetric efficiency remains high at all loads.

Engines can be sub-classified as (1) single acting four-stroke; (2) double acting four-stroke; (3) single acting two-stroke, and (4) double acting two-stroke. (1) is probably the simplest design to

operate and maintain, but suffers from the disadvantage that only one stroke in four is a power stroke, so that engines of very large powers, running at comparatively slow speeds, as in marine practice, require a number of very large cylinders and occupy an excessive space. The cylinder of a single acting two-stroke has one power stroke per rev., and with the same mean effective pressure would develop twice the power of a four-stroke cylinder of the same size; but problems of cylinder cooling and distortion become much more acute, and for this and other reasons the power increase is only 50-75 p.c. Cam-operated valves are not necessary, but are often fitted in the larger sizes to improve scavenging of exhaust gases. In all but the smallest engines with crankcase compression

a compressor is required for the scavenging air. Adequate scavenging of exhaust gases without undue



Internal Combustion Engine. Two-stroke cycle: crank-case compression

mixing is aimed at in all two-stroke designs, and this is impossible to obtain in the case of a petrol engine without loss of some of the charge through the exhaust port, so that two-stroke petrol engines are appreciably less economical in fuel than four-

stroke engines, and are used only in very small sizes, where simplicity is of more importance than economy.

In marine practice saving of space and weight is of the utmost importance, particularly in the case of larger engines developing up to 12,000 h.p., and here double acting engines are frequently adopted. The problems of design and operation are much more acute in such cases, since the heat flow is much greater and the piston, rod, and stuffing-box must be cooled by circulating oil or water through them. A number of different designs of both four-stroke and two-stroke double acting engines of the compression-ignition type are in use, but conditions of operation vary so much that definite conclusions are difficult to draw regarding the most suitable type for a specified purpose. Other problems which have given trouble are the balancing of reciprocating parts, torsional vibrations of shafting, and vibration of engine supports due to variations of torque on the crank-shaft (torque reaction). Double-acting engines have much heavier reciprocating parts than single-acting engines of the same type, but the crank-shaft is shorter with fewer cylinders and torque reaction effects are less, owing to greater uniformity of torque.

The fitting of a flywheel tends to smooth out variations of the torque

transmitted to the driven shaft. The flywheel effect of the rotating parts of the engine and in some cases of the driven member (e.g. a generator) are often quite substantial and reduce the necessary size of the flywheel.

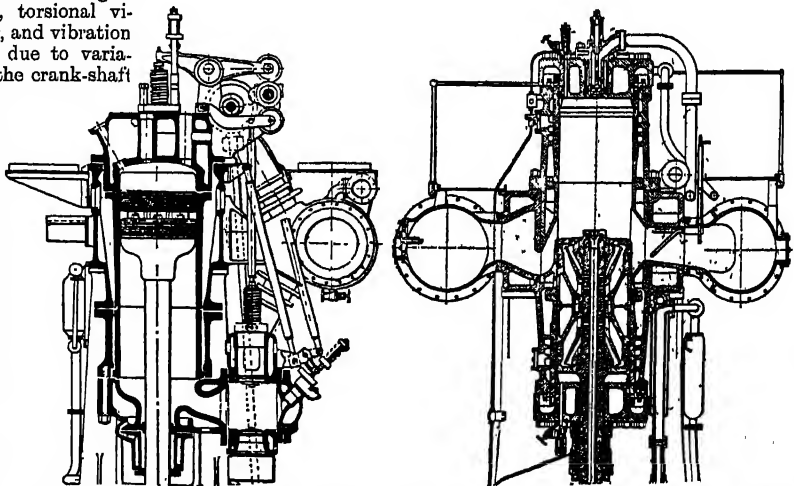
The mean effective pressure (and hence the power) which can be developed in a cylinder depends upon the weight of air in the cylinder at the end of the induction stroke. This weight can be increased by supercharging, i.e. forcing air into the cylinder at a pressure higher than atmospheric. This, of course, is common practice with aero engines, the object being to maintain the power at high altitudes. In marine practice the object of supercharging is to save space and weight by obtaining more power from a given size of cylinder. A turbine operated by the exhaust gases is used to drive a blower which increases the pressure of the air supplied to the engine, and by this means the engine power may be increased by from 50 to 60 p.c. Problems of heat dissipation, etc., are accentuated by this method.

The starting of large engines is usually effected by means of compressed air stored in reservoirs charged by an independently driven air compressor. Special starting cams are fitted to the camshaft which, when brought into action, convert the engine into a compressed air motor. At a sufficiently high speed the starting cams are disengaged and the working cams engaged, and the engine continues to operate.

In the combustion turbine, a competitor with the reciprocating engine, air is compressed by a

rotary compressor into the combustion space. Fuel is then injected and burned at constant pressure, the high temperature products of combustion being discharged through a turbine on the same shaft as the compressor. Part of the work done by the turbine is expended in driving the compressor, and the remainder is available for external work. The idea is by no means new, but developments in the past have been retarded by the low mechanical efficiencies of both compressor and turbine, coupled with troubles with materials at the high pressure end of the turbine. For instance, if the mechanical efficiencies of both compressor and turbine are 100 p.c., the compressor might take 40 h.p. and the turbine might generate 120 h.p. altogether, giving a net output of 80 h.p. If, however, the mechanical efficiency of each is only 60 p.c., the compressor would require 67 h.p. and the turbine would generate 72 h.p., giving a net output of only 5 h.p. Intensive research and experiment, coupled with the discovery of new heat-resisting materials which allow the use of higher maximum temperatures, have made mechanical efficiencies of over 85 p.c. practicable, together with a high maximum temperature, on which the thermal efficiency of the combination also depends, so that thermal efficiencies of over 30 p.c. may be reached in large sizes, which compares favourably with that of the reciprocating engine. (*See Gas Turbine.*)

For aircraft, the sizes of compressor and turbine are so adjusted that the turbine supplies just



Internal Combustion Engine. Double-acting oil engines: two-strokes on left, four-stroke on right

sufficient power to drive the compressor and the reaction of the exhaust gases issuing at a high velocity is utilised for propulsion.

Internal Standard. A metallurgical term. In spectrographic analysis it is necessary to measure the density of blackening of a photographic plate by a particular spectrum line. Since the position of the spectrum line is peculiar to the element concerned and the density of the line is proportional to the amount present, both qualitative and quantitative analyses are possible. Errors caused by plate variations can be reduced by employing an internal standard, i.e. a line due to the major element present and comparable in density to the line due to the element to be determined. Plate variations, differences in exposure time, development, etc., will then affect both lines equally, without altering the relative densities.

International. In sport, term for a contest between the representatives of two or more countries; and by extension, a player in such an event. Such a contest may be open to the world: the Olympic Games (*q.v.*), for athletics and for other amateur sports, and the Davis Cup (*q.v.*), for amateur lawn tennis, are two outstanding examples. Other categories of international are open to a small group of countries. There are the annual Association football series, for which England, Scotland, Wales, and Ireland compete, and the similar Rugby championship, to which France is also admitted. Internationals restricted to two nations are cricket test matches (*q.v.*), for which one country sends a team to tour another; and the Anglo-U.S.A. golf matches—the Ryder cup for professionals, the Walker cup for amateurs. Women's international matches become increasingly numerous.

International, THE. Name given to three series of congresses attended by socialist and communist delegates of many countries, and to the organizations supporting and being supported by them. The first international developed from the international working men's association, founded in 1864 by Marx and Engels as a revolutionary body to work for the aims of their communist manifesto of 1848. These aims included the abolition of private property in railways, mines, and land, the state ownership of factories and instruments of production, the public education of all children and the abolition of child factory

labour, the abolition of inheritance, and high and progressively graded income tax. The first international held congresses at Geneva, 1866, Lausanne, 1867, Brussels, 1868, Basle, 1869, The Hague, 1872, and Philadelphia, 1876.

The Communard rising in Paris in 1871 caused hopes to rise high; the collapse of the Commune brought a commensurate decline in the first international, within which there was dissension between the evolutionary socialists and the revolutionary communists. This culminated in the expulsion of the Russian anarchist Bakunin, who formed a rival international which operated principally in Spain and Italy until 1879.

The Second International

During the 1880s the labour and socialist movements revived and made substantial progress, particularly in Germany, Austria, and France, and the opening of the world exhibition in Paris, 1889, provided the stimulus for the formation of the second international. Its first world congress met in Paris, July, 1889. Subsequent congresses were held in Brussels, 1891; Zürich, 1893; London, 1896; Paris, 1900; Amsterdam, 1904, when the British labour party took part; Stuttgart, 1907, when the women's international was established; Copenhagen, 1910; and Basle, 1912. In 1900 a permanent international socialist bureau (I.S.B.) was established at Brussels.

The second international attracted such later outstanding men as Lenin, Mussolini, Briand, Ramsay MacDonald, Liebknecht, Laval, Vandervelde, Pilsudski, Bernard Shaw; but internal strife between evolutionaries and revolutionaries continued. Finally, at the London congress, 1896, the anarchists were expelled. The Amsterdam congress, 1904, resolved that there should be only one socialist party in each country; but the Russian Bolsheviks, who were revolutionaries, refused to be reconciled to the Mensheviks, who believed in collaboration with liberal opposition parties.

When Austria-Hungary declared war on Serbia in July, 1914, the I.S.B. called an international congress on Aug. 9 in Paris to discuss war and the proletariat. It decided that workers everywhere should demonstrate against war and demand arbitration. But the socialists of Germany, France, and Belgium voted war credits. Only Liebknecht in the German Reichstag and the Bolsheviks in the

Russian duma refused. In 1919 a new Labour and Socialist international secured the adherence of the moderate sections of most socialist movements, including the British Labour party. It relied on parliamentary action. Various congresses were held during the inter-war years.

In March, 1919, Lenin founded the Comintern (short for *Communist international*) or third international, based on Moscow. It admitted only revolutionary Communists, and its aim was to fight "by all available means, including armed force, for the overthrow of the international bourgeoisie and for the creation of an international Soviet republic as a transition stage to complete abolition of the state." It held congresses in Moscow in 1919, 1920, 1921, 1922, 1924, 1928, and 1935. The 29 conditions it set for membership of a Communist party were most stringent, requiring, among other things, active Communist propaganda among civilians, in the services, and within trade unions, ruthless purging of all reformists, illegal as well as legal organizations for subversive work, and agitation to uphold constantly the ideal of the dictatorship of the proletariat. Zinoviev was chairman from 1919 until 1926; Bukharin succeeded him until 1928, when the gen. sec. was made the chief official, Grigory Dimitrov being the first gen. sec.

Dissension in the Comintern

The Comintern in its early years was not free from dissension. One group, led by Trotsky, urged the need for permanent revolution in other countries in order to maintain the Soviet regime; the other, led by Stalin, claimed that Russia by her own efforts could establish socialism. Stalin's view prevailed, the sixth world congress, 1928, recognizing the need for affiliated Communist parties to cease promoting world revolution and to concentrate entirely on defending the Soviet Union. At the seventh congress, 1935, Dimitrov advocated the creation of a united front of all socialist and liberal parties in other countries in order to stem the rising flood of fascism. With Russia's entry into the war the Comintern, on account of its origin rather than on account of its policy at that time, became a liability instead of a help to the U.S.S.R., and it dissolved itself May 15, 1943. A new international body, Cominform (*Communist information*), representing at its initial meeting the Communist

parties of Russia, Poland, Rumania, Hungary, Yugoslavia, Czechoslovakia, Bulgaria, France, and Italy, was in existence during the years 1947-56.

An organization called Socialist International was formed in 1951 at a meeting at Frankfurt-on-Main as a link between non-communist Socialist parties.

International Affairs, ROYAL INSTITUTE OF. Unofficial and non-political organization founded in London in 1920 to encourage the unbiased study of international questions. The institute promotes the science of international politics, economics, and jurisprudence, and the study of literature on these subjects. It organizes research into international problems by individual scholars, and maintains study groups of experts. Since 1924 it has published a monthly journal, originally called the *Bulletin of International News*, renamed 1945 *The World Today*; and since 1922 a quarterly, *International Affairs*. During the Second Great War a research organization was set up for the British foreign office and discussion courses were arranged for the forces. Its head office is at Chatham House (*q.v.*), St. James's Square, S.W.1. It also has offices in Sydney, N.S.W.; New Delhi, India; Johannesburg, S. Africa; and New York, U.S.A.

International Bank FOR RECONSTRUCTION AND DEVELOPMENT. Organization set up Dec. 27, 1945, under Bretton Woods (*q.v.*) agreement. Forty countries (of 44 represented) ratified the agreement, and subscribed, according to an agreed quota, a capital of \$8,338,500,000. The bank was to assist, by loans and guarantees to states or companies, reconstruction of Second Great War devastation, and development in less advanced countries. Much of the work that might have fallen to the bank in Europe was in fact carried out under the European Recovery Programme (*q.v.*). Its first loan, in May, 1947, was to France (\$250,000,000); later loans, ranging from \$1,500,000 to \$195,000,000, were to *e.g.* Abyssinia, Australia, Brazil, Finland, India, Pakistan, Poland, Yugoslavia. On June 30, 1952, loans made totalled \$1,412,133,000.

International Brigade. Military organization of foreign nationals who fought for the republican government in the Spanish Civil War (*q.v.*). The brigade first went into action at the defence of Valencia in Nov., 1936.

At maximum strength it numbered about 30,000, representing some 30 nationalities. British subjects formed two battalions, one called the Clement Attlee battalion, and 543 of them were killed in action. Upon the non-intervention agreement of 1938, the International Brigade was disbanded on Sept. 28.

International Court of Justice. One of the achievements of The Hague peace conference of 1899 was the establishment of a permanent court of arbitration. This was not a court in continuous session, but a panel of arbitrators from which the parties to a dispute could select a tribunal. It still exists, although since 1914 the need to resort to it has lapsed. In 1922 there was established under the League of Nations, the permanent court of international justice, with jurisdiction to decide all disputes voluntarily submitted to it by states. With the dissolution of the League this ceased to exist. Its place was taken, and its work continued by the international court of justice created 1945 under the United Nations charter. This court may pronounce upon matters of international law submitted to it by the organs or members of the United Nations.

Internationale, L'. International anthem of the Communist parties and, until Dec. 19, 1943, national anthem of the U.S.S.R. The original words were written in French in 1871 by Eugène Pottier, and set to music about 20 years later by Pierre Degeyter, a Lille artisan. The first verse of the English version reads:

Arise, ye starvelings, from your slumbers;
Arise, ye prisoners of want!
For reason in revolt now thunders
And at last ends the age of cant.
Now away with all your superstitions;
Serve the masses, arise, arise!
We'll change forthwith the old conditions
And spurn the dust to win the prize.

Refrain

Then comrades, come rally
And the last fight let us face,
The Internationale
Unites the human race.

International Falls. City of Minnesota, U.S.A., the co. seat of Koochiching co. It is on the S. bank of the Rainy river, the boundary between the U.S.A. and Canada, and is served by rlys. and an airport. It is the headquarters of branches of the international border patrol having charge of immigration and customs inspection, also a port of entry. The Minnesota and Ontario Paper Co. built here in 1916 the world's first mill for making

insulate, a wood-fibre board for insulation. There are lumber mills, and newsprint is produced. Koochiching Falls provide 25,000 h.p. for the mills. The place was settled in 1731, and became a city in 1910. Pop. (1950) 6,269.

International Labour Organization. International body which aims at securing common action by member states on matters affecting labour. Originally set up by the League of Nations under the treaty of Versailles, it operated through an autonomous International Labour Office financed by the League but independent of it from an executive point of view. The first meeting was held at Washington in Oct., 1919, and there the International Labour Office was constituted, Albert Thomas of France being appointed director. Permanent headquarters were at Geneva, where annual conferences were held until the Second Great War. The staff was then mostly transferred to McGill university, Montreal, whence it returned to Geneva in 1946.

Every member of the League was entitled to send four delegates to each conference: two on behalf of the government, one of the employers, and one of organized labour. The governing body of the organization numbered twelve, six to represent the employers and six the workers; eight of these came from major industrial powers, including Great Britain, Canada, and India. Non-members of the League could belong to the organization, and the U.S.A. took part in all conferences from 1933. Germany withdrew on leaving the League, but Italy and Japan remained.

The position of the organization became somewhat anomalous with the winding up of the League in 1946, but the charter of the United Nations made provision for bringing such "specialised agencies" within its scope. Soviet Russia had violently attacked the I.L.O. in 1944, because of its former association with the League and of the representation of employing interests on the governing body. Nevertheless, the new constitution was approved in Paris in Nov., 1945, and the membership raised to 48 states. The governing body, now 16 strong, set up international committees for the transport, mining, iron and steel, engineering, textile, oil, and building industries. At conferences, conventions on conditions of employment are proposed,

and adopted for recommendation if supported by a two-thirds majority. Members are then bound to submit the recommendations to their govts. for legislation within twelve months. Those adopted by a govt. must not be revoked within ten years. The I.L.O. also acts as a centre for industrial information. In Great

Britain the minister of Labour deals with international labour policy. By 1942 the international labour conferences had adopted 67 conventions and 882 ratifications had been secured, especially on matters concerning unemployment and the conditions of merchant seamen. Expenditure for 1945 was about £670,000.

INTERNATIONAL LAW: ORIGIN & SCOPE

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Regulation of the relations between states is an ancient idea which has been reformulated through the ages. Here is its history, and an account of the current scope of international law. See also Blockade; Embargo; Geneva Convention; Gentili, Alberico; Grotius, Hugo; International Red Cross; and under Aviation

The phrase international law was first used by Jeremy Bentham in the *Principles of Morals and Legislation*, 1780, to denote the legal relations between sovereign states. The concept, however, is far older than that, and in its modern form derives from the political, economic, and social changes of the Renaissance.

A detailed code of ceremonial relationships existed between the city-states of ancient Greece. These related to such matters as the privileges and inviolability of heralds, the proper causes of war and the proper method of declaring war, the treatment of prisoners, and the construction of treaties. Similar usages governed the relations between the ancient kingdoms of India and of China.

Medieval Chivalry

The kingdoms of medieval Europe followed a common set of ceremonial observances, defining the status and privileges of envoys and heralds, the mode of concluding treaties and the sanctity to be attached to them, and in addition, governing the conduct of war, the treatment of prisoners, their ransom, and the permissible measures which could be taken against towns that surrendered and those that were taken by assault. These medieval rules were evolved in large part from the rules of chivalry of Western Christendom, which was regarded as a single society whose twin heads were the emperor and the pope.

The Renaissance and the Reformation destroyed this conception of medieval Christendom as a single society. The Reformation split it in the religious sphere, and in the nations which followed the reformed religion either the ruler or parliament arrogated to itself the right to determine religious belief. Moreover, the age of discovery brought the nations of

Western Europe into fairly close contact with non-European peoples of non-Christian religion, and, even in Western Europe, the emergence of new nation states, such as England, France, and Spain, coincided with very considerable extensions in the power of the rulers of those states, both internally over their subjects and externally in their foreign relations. Further, the older system of feudal warfare, in respect of which the medieval rules had been developed, had been replaced by the warfare of mercenary armies, which accepted few restraints upon their activities in relation to the civilian population; and the wars of the 16th century were in general waged with great savagery and few restraints, whilst the Thirty Years' War (1618-1648), in which at one time or another all the nations of Europe were involved, gave rise to miseries so great that there was a general recognition of the necessity for defining the conditions which states should observe in war.

Post-Reformation Doctrine

Some writers of the 16th century, generally known as the Spanish school, advocated the re-establishment of the medieval system, with modifications. Their writings failed to win general acceptance, however, for the nations which had embraced Protestantism rejected the authority of the pope and of the canon law. Moreover, after the Renaissance even Catholic rulers rejected external limitations upon their sovereignty, at any rate in the political sphere. What was needed, therefore, was a body of doctrine which would take as its starting-point the sovereign independence and equality of the states.

The founders of this new science were Alberico Gentili (1552-1608) and Hugo Grotius (1583-1645).

After obtaining his doctorate in law, Gentili was appointed to judicial office, but was compelled to leave Italy because his family had embraced Protestantism. He took refuge in England in 1580, and settled in Oxford. Seven years later, he was appointed regius professor, and the government consulted him frequently upon international questions. His treatise upon international law, published shortly after the destruction of the Armada, is the starting-point of the modern concept. Gentili constructed his rules primarily from the recent practice of states. He also departed from the practice of all his predecessors by admitting non-Christian nations within the community of nations governed by the rules of international law (or, as he termed it, the law of nations).

System of Grotius

The work of Gentili considerably influenced his better-known successor, Grotius, usually styled the father of international law. Grotius took his doctorate in law in 1597 at the age of 14. At 15 he became a member of the Dutch embassy to the French court, and in 1604 he was appointed advocate-general of the Netherlands. He later became involved in the religious and political controversies of his country, was imprisoned, but escaped, 1620, to France, and subsequently to Sweden. His great work, *De Jure Belli et Pacis*, was published in 1625, during the Thirty Years' War, the barbarities of which he denounces in the strongest terms. Like Gentili, Grotius appeals primarily to the practice of states, but he also makes fuller use of rules of natural law, and even of illustrations drawn from classical antiquity and from the Bible.

With the inauguration of a new European system at the peace of Westphalia, 1648, the Grotian system of international law can be considered as firmly established. This system accepted as its starting-point the sovereign independence and legal equality of states. Their obedience to international law therefore depended upon their consent which, once given, was regarded as incapable of being withdrawn. Thus it followed that international law sought to invest treaties—the formal written undertakings of states—with special sanctity, for unless reliance could be placed upon the pledged word of states, the whole system collapsed. It also followed that the absence of any superior coercive authority

implied that international law must necessarily accept the fact of war between states—that is to say, as the ultimate method of settling international disputes. The most that international law could do was to seek progressively to ameliorate the conditions of warfare by the elaboration of rules acceptable to all nations on the basis of reciprocity. Thus international law was an imperfect law in the sense that it lacked the compulsive force of an impartial superior authority. It was also a law of extremely limited function, though within those narrow limits the rules were clear and, at any rate as far as the laws of peace were concerned, they were generally followed.

THE LAW OF PEACE. The only subjects of international law are states. An individual as such has no existence in international law, although he may be the medium by which his state acquires or loses rights. The first question in international law is therefore to determine what communities are entitled to international personality, how they come into existence, and how international existence is lost.

Oriental Nations Accepted

A state becomes a personality in international law through the general recognition of it by other states. Thus, in the 19th century, the oriental nations were progressively admitted within the society of nations governed by international law. Further, the existence of a state is in no way prejudiced by changes in its government or territory. On the other hand, a state obviously loses its international personality where it is completely annexed by another state. Important and delicate problems arise where a portion of a state revolts and maintains organized hostilities against the parent state. Other states may here recognize a state of belligerency, conferring on the rebels the rights of a belligerent, and the limited international personality necessary to sustain these rights. The question of the recognition of belligerency was of very great importance during the American Civil War (1861–1865). If the rebellion is successful, then third states have to decide when the time has come to recognize that independence has been achieved, in this way recognizing that a new state has come into existence.

A state owns property, the most important of which is the territory over which its authority extends. Such territorial property may be acquired in various ways,

for example, by occupation, conquest, cession, or accretion. Title by occupation was of great importance when new areas were being discovered and settled; the conflicting claims to areas of the Antarctic continent are a more recent example under this head. Occupation, to be valid in international law, must be continuous and effective, though what constitutes effectiveness may vary. Thus, in the 19th century it was doubted whether the Antarctic could be effectively occupied; the general consensus of international opinion in the 20th would seem to be that it can.

The Effects of Conquest

Conquest sets up a title which in the first instance depends upon superior force. Later, it acquires a quasi-legality through long-continued effective possession. There is, however, no generally accepted rule of prescription, and in consequence titles of long standing may be lost through a change in circumstances, even independently of treaty. Thus, the titles of Russia, Germany, and Austria to Polish territory, acquired in the first three partitions, were set aside by the events of the First Great War.

Cession differs from conquest in that title is derived from a formal treaty, even though the treaty may be itself the result of a successful war, to which the defeated state assents only under duress. Thus, Alsace-Lorraine passed to Germany in 1871, and was returned to France in 1919, by cession. Accretion occurs when new land is added to the territory of a state either through natural forces, or through human effort by reclamation.

The state also has a proprietary interest (though of different degree) in its public ships, whether ships of war or other vessels, and in the merchant ships which fly its national flag. This gives the state jurisdiction over persons in those vessels, and over acts done upon them. In general, the sea cannot be the subject of proprietary claims by any state; but all states exercise jurisdiction over maritime water, i.e. seas adjacent to their territory, although the extent of this jurisdiction is not generally agreed. Originally, it was a distance of three m. from the shore, with extensions to cover deep bays and inlets.

A state exercises jurisdiction over all persons situate on its territory, with some exceptions. Thus, foreign sovereigns and the diplomatic representatives of foreign states (and many classes of

officials of the United Nations organization) are exempt from local jurisdictions. Moreover, by international practice, extensive immunity is also conceded to the public vessels of foreign states.

Where two states are involved in a dispute there exist several peaceful methods of settling the dispute independently of any machinery established by the United Nations. Initially, an attempt will be made to settle the dispute by ordinary diplomatic methods. These failing, the contesting parties may submit the dispute to arbitration or to settlement by an international judicial tribunal. From 1898, many states have signed arbitration treaties, agreeing to submit all, or some classes of, disputes arising between them to the decision of an arbitral tribunal. Following the establishment of the League of Nations, there was set up in 1923 a permanent court of international justice, with nine judges and six deputy judges, selected from the world's most distinguished international lawyers. For the decision of all cases which nations chose to submit to it. Following the Second Great War, this court was reconstituted as the world court of international justice. Like its predecessor, the court has only a limited jurisdiction, exercised mainly for the determination of doubtful points under treaties or for the declaration of rights under international law. Decisions on major political controversies between nations lie with the security council of the United Nations.

Pacific Blockade and Reprisals

Should arbitration fail, or not be sought, one of the disputants may put constraint upon the other in order to compel it to give satisfaction. Such measures are pacific blockade, reprisals, or an embargo upon the commerce of the opponent. Should all these measures prove ineffective, then, before 1919, the only remaining action possible was a resort to war.

THE LAW OF WAR. The branch of international law governing the relations of states which are at war has been frequently subjected to criticism, more especially since (i) the successive developments in the methods and weapons of warfare have made it necessary progressively to modify the rules, and (ii) experience has shown that in major wars, involving great powers struggling for survival, there is a distinct likelihood that a state in danger of defeat will violate the laws to secure a new advantage.

Grotius discussed the laws of war for the purpose of standardising state practice, and also for the purpose of cautiously suggesting certain *temperamenta*, or modifications, by means of which practice could be softened. In general, the rules as so defined were followed by the European nations in the wars of the 18th century. Even in the century between 1815 and 1914 there was sufficient community of interest between the European powers to secure the observance of the rules as then understood, and also to secure such ameliorations as the general acceptance of the Geneva convention, 1864, with the immunities which it conferred upon medical services operating under the Red Cross.

The Hague Conventions

Finally, at The Hague peace conferences of 1899 and 1906, a series of conventions was drafted, to which the majority of states adhered, governing many of the incidents of warfare, such as the granting of days of grace to enemy merchant ships in port at the outbreak of war, the treatment of prisoners of war, the use of poison gas, the bombing of undefended towns, and the laying of mines in the open sea. These rules failed to withstand the stress of the major war of 1914-18. At various times between the First and Second Great Wars, efforts were made at international conferences to secure the abandonment of various methods of waging war, e.g. by unrestricted submarine warfare, or by the bombing from the air of open towns; but these rules were disregarded in the Second Great War. Nevertheless, some rules, such as those governing the treatment of prisoners and wounded, stood the test of total warfare somewhat better than rules seeking to prohibit the use of certain methods of warfare, although the Second Great War showed a very serious retrogression on the part of Germany so far as the treatment of the civilian population of occupied territories was concerned.

THE LAW OF NEUTRALITY. When a state of war exists between two or more belligerents, those states which do not participate in it must preserve, as far as the belligerents are concerned, the status of neutrality. Neutrality confers privileges, but it also involves obligations. The basic principle of neutrality is that a neutral state, in seeking to preserve its normal relations with the belligerents in time of war, must not, in so doing, assist one of the belligerents in the

prosecution of the war to the detriment of another. Thus, a neutral must not permit the fitting out on its territory of ships of war for the use of a belligerent. In the Alabama arbitration, 1870, the U.S.A. was awarded substantial damages against Great Britain who had permitted the building of the Confederate commerce raider Alabama in a British port during the American Civil War. The sale by the U.S.A. of 50 destroyers to Great Britain in 1940 was justified on the ground that at the date the U.S.A. had proclaimed the abandonment of neutrality in the struggle with Hitler, although she did not become a belligerent until Dec., 1941, and also on the ground that Germany was waging an aggressive war (evidenced by the conquest of Poland) in defiance of the Kellogg Pact, 1928, renouncing war as an instrument of national policy, to which Germany and the U.S.A. were signatories.

Obligations of Neutrals

In conducting his commerce with a belligerent state, a neutral is subject to the rules governing blockade and the carriage of contraband. A neutral may not allow his territory to be used by a belligerent as a base for any form of hostile operations.

INTERNATIONAL LAW IN TRANSITION. For nearly three centuries, international law, as defined by Gentili and Grotius, comprised a body of doctrine of reasonably precise content, accepted and applied by states in their dealings with one another, but lacking the compulsive force of a supernational authority, and accepting the fact of war as a relation of states. The apparent growth of international law-abidingness in the 19th century led writers to several conclusions:

(i) That with the increasing interdependence of states, and the steady growth of commerce, states would be increasingly reluctant to go to war;

(ii) In consequence, the rules of international law would acquire greater certainty of application because of the general reluctance to go to war;

(iii) On the occasions when wars unhappily broke out, the development of international public opinion and the rapid advance of civilization would be directed towards minimising its impact upon the civilian population, and towards humanising the actual conduct of military operations themselves.

International history since 1914 has shown the fallacy of all these conclusions. Wars between major powers today are totalitarian wars i.e. they involve entire populations. Also successive advances in mechanical ingenuity have coincided with more brutal practices towards opponents than at any recent period in European history.

The League of Nations

The revelation of the inadequacy of the consent of states as the basis for international law, coupled with the desire to eliminate warfare as the greatest scourge to which humanity is subject, the deadliness of which is today a threat to the very survival of the race, has resulted in a new approach to international law. The first requisite for a really effective law is now seen to be the establishment of an effective supernational authority to enforce it, so that a state can be forcibly prevented from going to war if peaceful methods of settling an international dispute have failed. When the League of Nations was established in 1920, it was still assumed that conduct such as that of which Germany had been guilty was exceptional, and that the collective will of law-abiding nations, united by the League Covenant, would be sufficient to restrain a future aggressor. Accordingly, instead of attempting to organize all its forces in the service of peace the League covenant contemplated a general disarmament of nations—an ideal which, in the disturbed inter-war period, no state was prepared to put into practice. Further, no adequate machinery was established for the purpose of settling peacefully the major political claims of nations. These arise from the claims of one state to modify the political status quo in its favour, and are often claims to territory which admittedly belongs to another state. Such disputes under the League covenant were to be brought either before the League assembly or the League council, and between states of lesser importance, the League was an effective instrument for peace, but even in pre-League days such disputes had frequently been settled by international conferences. In 1880, for example, the congress of Berlin settled a major dispute between Russia and Turkey involving the development of the Balkans. Where a dispute involved a major power, however (e.g. the Manchurian affair, 1931, and the Italo-Abyssinian War, 1935-36), the League proved

powerless to compel a determined aggressor to accept peaceful methods of settling international disputes. The League failed because states were not prepared to set up an international authority sufficiently strong to override individual national sovereignties with adequate compulsive force.

In the later stages of the Second Great War a second international authority—the United Nations—was established, Oct. 24, 1945, following the San Francisco conference, April–June, at which a charter was drafted and approved. The new organization preserved many of the features of the League, but there were important changes. Power was now concentrated in the security council, of which the five great powers (the U.S.A., the Soviet Union, Great Britain, France, and China) are permanent members and in which they have a preponderant voice. The United Nations charter provided for national contingents to be placed at the disposal of the security council, for use against an aggressor. The charter also contemplated that all future international disputes shall be settled peacefully, either by arbitration, or by decision of the world court (the international court of justice) or by decision of the security council. Like the League, however, the United Nations is an association or confederation of states. It is not, in itself, a superstate, and it does not solve the problem how war can be averted if a great power becomes an aggressor.

One further legal development must be noticed. On the conclusion of the Second Great War international tribunals composed of judges of the victorious powers were set up to try, not only military and other agents of the defeated states who had authorised gross violations of international law and international morality, but also those who had been prominently associated with the preparation and prosecution of aggressive war. Such trials set a precedent. See Nuremberg Trials.

International Law, Institute of. Society founded in 1873 for the study of international law. It consists of members and associates, the number of each being limited to 60, and jurists of all nations are eligible for membership. No nation is allowed to have more than one-fifth of the members. In normal times the institute holds an annual meeting in some European city. In 1904 it was awarded the Nobel peace prize.

The International Law Association was founded in Brussels, also in 1873; a deputation of eight members of the above institute taking part in its establishment. This association is not limited to jurists; its present membership exceeds 1,000.

International Monetary Fund. Established under the Bretton Woods (*q.v.*) agreement of July, 1944, ratified by Great Britain in Dec., 1945. The fund, although reckoned in American dollars for convenience, consists of gold, dollars, and to a lesser extent the currencies of other member states. It totals, as originally provided, \$8,800 millions and is held as to 50 p.c. in the U.S.A., where is the principal office, and as to 40 p.c. in Great Britain, the U.S.S.R., China, and France. It is managed by a board of governors.

By drawing on the fund a state may, subject to strict regulations, obtain foreign currencies to balance temporarily those it is receiving from current trade and finance with those it needs to pay for essential imports and services. Thus the quota subscribed by each member is available for much the same purposes as the reserve of gold held formerly by nations adhering to the gold standard. Like gold, a cheque on the fund will always produce more of any foreign currency, thereby enabling trade to continue. But, like the gold reserve, the sum available is not inexhaustible. Therefore any state that is unable to increase exports and thus obtain foreign exchange may devalue its currency by up to 10 p.c. below the established parity. This should stimulate exports. In this respect membership of the fund differs from adherence to an unalterable gold standard.

The conditions in which the fund would work were envisaged thus:

Each nation undertakes to conduct its external currency arrangements according to rules. It must permit free dealings in its currency at all times by all other members, so far as those transactions arise from current trade and normal finance. It must not block funds belonging to foreign nationals. It must accept as the par value of its currency the exchange value ruling on the sixtieth day before its joining the fund, and must not, except as indicated above, thereafter alter that value. It must avoid competitive alterations in exchange rates such as were frequently made before the Second Great War in an endeavour to obtain a greater share of foreign trade. Nations are

intended through their representatives to collaborate upon international monetary problems.

By divorcing current exchange transactions from those arising from large and prolonged capital movements, it was hoped that the latter would not lead to such exchange disturbances as constituted a major cause of trade depression between the Great Wars.

International Red Cross. Organization for the relief of war victims. A strictly neutral body, acting on behalf of all signatories of the Geneva Convention impartially, it seeks to extend the Red Cross movement to all countries:



International Red Cross Society's flag

to notify to existing signatories the constitution of new Red Cross societies; to induce all civilized states to adhere to the Geneva Convention; and to act as neutral intermediary between governments and Red Cross societies. Its committee strives to assist prisoners of war materially, morally, and intellectually, to visit their camps, and report to the governments concerned on their conditions. Since 1919 protection has been extended to civilian internees.

The International Red Cross movement originated in 1863, when a Swiss, Henri Dunant, horrified by what he had seen on the battlefield of Solferino, organized a conference attended by experts from 36 powers. The Geneva Convention was accepted by 26 powers on Aug. 8, 1864, laying down certain principles to be observed in war: the wounded to be respected; military hospitals to be neutral; and medical personnel to be protected. The symbol of the Red Cross was adopted, being an inversion of the Swiss flag. The provisions were later extended to the crews of ships at sea.

The committee gave relief to the wounded during the Franco-Prussian War of 1870, the Russo-Turkish war of 1877, and the Balkan wars of 1912–13, in which for the first time it took up the question of prisoners of war. In the First Great War, P.O.W. relief became the committee's first concern: it set up an agency in Geneva, with a card index of seven million names. Another convention relative to prisoners of war was ratified by 44 states (excluding Russia and Japan) in 1929. The committee was active in the Gran

Chaco war, the Abyssinian war, the Spanish Civil War, and the China-Japanese conflict. In Sept., 1939, it opened a central P.O.W. agency, and offered its services impartially to all belligerents. By 1945 its card index had 39 million names, 60 million letters had been forwarded, and relief furnished worth 3,400 million Swiss francs. The committee received the Nobel peace prize in 1918 and 1944.

Of four new conventions adopted in 1949, three were amendments of existing conventions on treatment of prisoners of war, care of wounded soldiers and sailors, and maritime warfare. The fourth called for the designation in peace-time of "security zones" for the sick and wounded, children, mothers and aged persons, and laid down rules for the treatment of the inhabitants of occupied countries. *Consult* Warrior Without Weapons (life of Dunant), M. Junod, 1951.

International Settlement. A town or port assigned by a country to nationals of other countries for the purpose of facilitating foreign trade. At one time there were some 30 in China, where foreigners could try their own nationals in their own courts, maintain a separate police force, and have a majority in the municipal administration and preferential rights in paying taxes. The chief international settlement was in Shanghai. In 1943 Great Britain and the U.S.A. surrendered all extra-territorial rights in Chinese treaty ports and international settlements, and other countries followed suit.

International Telecommunication Union. Body which maintains international cooperation in the development of telecommunications. It came into existence when the international telegraph convention of 1865 and the international radio-telegraph convention of 1906 were in 1932 combined in the international telecommunication convention, later revised.

International Units. Units of measurement accepted internationally so that scientific results can be uniformly presented and related to identical standards. They are those of the m-k-s. (metre-kilogram-second) system where the basic units are the metre (length); the kilogram (mass); and the second (time). The international bureau of weights and measures adopted the "international prototype metre," represented by a platinum-iridium bar engraved with the length; and the "international prototype kilogramme," represented by a plati-

num-iridium cylinder having the mass of 1 kg. For the time unit, one second is taken as 1/86,400 of the average duration of the "apparent solar day." Official equivalents in British measures are yard, .914399 metre; pound, .45359243 kg. These equivalents were made legal in Britain in 1898.

The difficulties involved in measuring the absolute electrical units as defined theoretically led to an international conference in London in 1908, which adopted physical standards for an ohm and an ampere intended to be equal to 10^9 e.m. units of resistance and 10^{-1} e.m. units of current respectively. The international ohm was defined as the resistance offered to an unvarying current by a column of mercury at 0°C., 14.4521 gm. in mass, of constant cross section, and 106.300 cm. long. The international ampere was defined as the unvarying current which when passed through a solution of silver nitrate in water deposits silver at the rate of 0.00111800 gm. per sec. Other international electrical units were derived from these. In the course of time, however, improved methods of measuring absolute units showed that the physical standards laid down in 1908 were not quite accurate, and from Jan. 1, 1948, the absolute units were reestablished as standard, with the following relations:

<i>International</i>	<i>Absolute</i>
1 ohm	= 1.00049 ohm
1 ampere	= 0.99985 ampere
1 coulomb	= 0.99985 coulomb
1 volt	= 0.00034 volt
1 farad	= 0.99951 farad
1 henry	= 1.00049 henry
1 watt	= 1.00019 watt

An international scale of temperature was adopted in 1927, to conform with the thermodynamic scale as closely as the state of knowledge at the time allowed. Certain basic fixed points were established, ranging from the "oxygen point" at -182.97°C , to the "gold point" at $1,063^\circ\text{C}$.

International units have also been established for biological substances such as vitamins, anti-toxins, antibiotics, etc. If the exact chemical constitution of the substance is known, and if the amount of the substance present can be tested by purely chemical and physical means, the unit can be expressed in terms of the weight of the pure substance. Examples are vitamin B₁ and vitamin C. Frequently, however, the chemical constitution is not known, and sometimes even when it is known the process of physical and chemical analysis is too complicated or

expensive for routine use. In these cases the potency or "activity" of a preparation is tested by noting the effect of a given quantity on living tissues under prescribed conditions. When a technique is found that leads to reliable results, international units of activity based on these biological tests are defined by the Expert Committee on Biological Standardisation of the World Health Organisation and standard preparations are made available through National Control Centres in individual countries.

Internment. In war, the confinement or curtailment of liberty of individuals whose presence in a country constitutes a threat to security or a violation of international law. Troops of belligerents entering neutral territory are forced to disarm and to remain there until the end of hostilities; they are then said to be interned. During the First Great War, Allied troops who in 1914 retreated into Holland were interned there; during the Second Great War airmen who made forced landings in Sweden, Switzerland, and Eire were interned for the duration of hostilities. Prisoners of war escaping into Switzerland were also interned there. Ships of war staying in a neutral port more than 24 hrs., except under stress of weather or damage (when some extension is normally allowed), and merchant vessels remaining in the harbours of hostile countries after the declaration of war are also interned, with their crews. During both Great Wars each side interned civilians of enemy nationality. In 1940 British nationals suspected of being potential fifth columnists were arrested in Great Britain under regulation 18B and confined for varying periods. The term internment was sometimes applied to the confinement in concentration camps of their political opponents and others by the National Socialists in Germany; and is also sometimes extended to cover the confinement of prisoners of war. See Alien; Concentration Camp; International Law; Prisoner of War.

Internode. A botanical term applied to the portion of the stem between two nodes (regions of leaf attachment). The internodes are short in leafy buds but usually elongate to separate the leaves as the bud opens. This elongation is the main cause of growth in length of the shoots. During the opening of flower buds elongation

of internodes seldom occurs and the flower remains compact.

Interpleader (Lat. *inter*, between; Fr. *plaideur*). English legal term. A person who has the custody of goods or money claimed by two or more hostile claimants can make them fight it out, at the same time declaring his disinterestedness and willingness to hand over the property to the successful litigant. This is interpleading, and if he fails to do it he runs the risk of having actions brought against him by both the claimants, one of which he is almost certain to lose.

Interpolation. Mathematical process for obtaining intermediate values of a series of which only particular terms are given. The operation is important for astronomers, actuaries, statisticians, and research workers. Sometimes it is possible to interpolate to the necessary degree of accuracy by mere proportion. For example, suppose it is desired to find the logarithm of 3-82757, and the tables show:

log 3-8275 = 0-5829152,
log 3-8276 = 0-5829265.

The difference for 0-0001 is 0-0000113. By simple proportion a difference of 0-00007 in the number will cause a difference of 0-7 of 0-0000113 in the logarithms, i.e. of 0-0000791; hence the logarithm of 3-82757 will be 0-5829152 + 0-000079 = 0-5829231. Most forms of interpolation are less simple, and mathematicians use special formulae, the calculations being performed by machines.

Interregnum (Lat. *inter*, between; *regnum*, rule). In ancient Rome, name given to the interval between the death of a king or chief magistrate and the election of another. During this interval, the royal office or chief magisterial power was held by an official called interrex (between-king), who was appointed by the patrician members of the senate. The period in German history between 1254 and the election of Rudolph of Hapsburg as king in 1273 is called the Great Interregnum.

Interrogatory (Lat. *interrogare*, to ask). Term of English law. In a civil action in any English court of law or equity either party can, before the trial, obtain permission to put questions in writing which the other party must answer on oath. The questions must be strictly relevant to the issues in the action as disclosed on the pleadings, and must not be in the nature of cross-examination. Interrogatories which are merely leading, i.e. attempts to elicit what the opponent's case is,

questions as to credit, and the like, are not allowed. The party interrogated may decline to answer any question on the ground that the information is privileged, or that the answer would tend to incriminate him. It is the duty of the master and judge in chambers to see that interrogatories are not prolix or oppressive.

Intersex. Term used in biology. In many animals, e.g. mammals and birds, the development of the differences by which the two sexes are distinguishable depends upon the action of substances generally called sex hormones. These substances are made by the embryo as a part of its metabolism, i.e. the totality of its chemical building up and breaking down. The kind of sex hormones elaborated by any embryo depends upon its possession of gonads, or primary reproductive organs, which develop into either testes or ovaries, according to the chromosomal make-up of the fertilised egg. If the make-up is of one kind the gonads will develop as testes, and the presence of these testes, growing normally, will induce the embryo to make male hormones (using the word in a wide sense); if of the opposite kind, the gonads will develop as ovaries, and the embryo will make female hormones.

In order that the characteristics by which sex is recognized should develop normally, the supply of hormones must be right throughout. If for any reason the supply is interfered with, distorted, or switched from one kind to another at any point during development, the latter will go amiss. Each embryo has the potentiality to develop characters of either sex, and so disturbances and distortions and reversals will produce an adult some of whose characteristics will be appropriate to one sex and some to the other. In this sense an intersex is a sex-mosaic in time, as opposed to a gynandromorph, which is a sex-mosaic in space. Behaviour patterns of one sex are sometimes to be seen in individuals of the opposite sex. But caution should be used in arguing that homosexual behaviour implies intersexual development.

Intertrigo (Lat. *inter*, between; *terere*, to rub). Chafing or irritation of the skin produced by friction of two opposed surfaces, such as may occur in the folds of the thighs and neck, or in the armpits, in young infants. The parts should be well cleaned and dried, and dusting powder applied.

A soothing soap should always be used for infants.

"Intertype." Trade name for machine for setting up (or arranging) words in matrix lines and casting them into slugs—individual solid lines—of letterpress printing type. In principle it is the same as the "Linotype" (*q.v.*).

Interval (Lat. *inter*, between; *vallum*, rampart). In music, the difference in pitch between two sounds. Intervals are named numerically according to the number of alphabetical names which they include; thus, C to E is a third, as it includes the three scale-notes C, D, and E; C to G is a fifth, and so forth. Each numerical kind of interval may also vary in quality, as major, minor, etc. Intervals are recognized by the ear as ratios of frequency rather than by differences of frequency.

Intestacy (Lat. *in*, not; *testari*, to make a will). Legal term for the state of affairs which arises when the owner of a property dies without making a will. It is possible to be partly testate and partly intestate; as where one makes a will which disposes of only part of the property, or where the residuary legatee dies during the lifetime of the testator.

Where a person domiciled in England has died intestate on or after Jan. 1, 1953, the following are in outline the rules which determine the persons to whom his estate passes:

Where there is a widow or widower surviving and

(a) no descendant widow or widow of the intestate er takes all the and no full brother-estate or or sister or descendant of deceased brother or sister—

(b) descendant of widow or widow of the intestate er takes (1) all (whether or not personal chat-there is also a tel; (2) £5,000; parent, full bro- (3) half residue of ther or sister or estate for life; descendant of de- *child of intest- ceased full bro- ate takes residue ther or sister) — of estate subject to the life interest

(c) no descendant widow or widow of intestate but er takes (1) all parent or full bro- personal chat- ther or sister or tels; (2) £20,000; descendant of de- (3) half residue ceased full bro- absolutely; ther or sister— Parent (or if no parent alive any *full brother or sister) takes other half absolutely.

A widow or widower is given the right to take over the dwelling.

house which has been the matrimonial home and also to take, instead of a life interest, a capital sum of the equivalent value.

Where there is no widow or widower the estate passes to the following persons in order :

- *(1) children of intestate ;
- (2) parents of intestate ;
- *(3) full brothers and sisters of intestate ;
- *(4) half-brothers and half-sisters of intestate ;
- (5) grandparents ;
- *(6) full uncles and aunts of intestate ;
- *(7) half-uncles and half-aunts of intestate.

Where there is more than one person in any of the above classes all the persons in the class share equally. If none of the above survives the intestate, the estate passes to the Crown, which may make provision out of it for any dependants of the intestate not in the above classes.

* Persons of these classes living at the death of the intestate take their share only if they live to be 21 or marry under that age. Until one of these events happens their prospective share may be used for their advancement and maintenance. If a person in one of these classes has died before the intestate leaving a child or children, the child or children on becoming 21 or marrying under that age take the share to which their parent would have been entitled had he (she) survived the intestate.

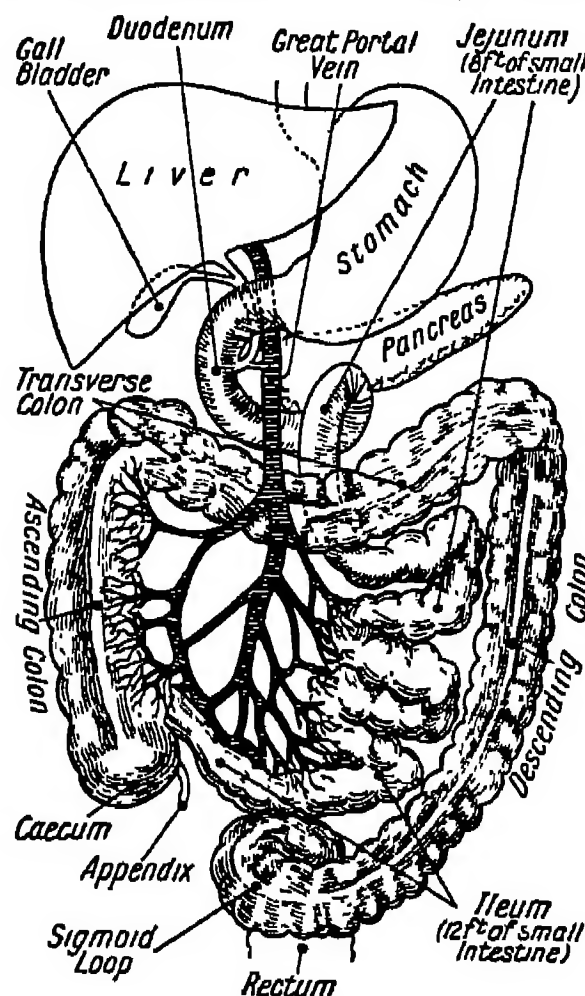
Where a person died domiciled in England and if as a result of his will (or, if the death was on or after Jan. 1, 1953, the rules of the law of intestacy or the combined effect of his will and these rules) reasonable provision is not made for any dependant then the dependant may apply to the court for an order that reasonable provision may be made for him (her) out of the estate. "Dependant" means (a) a widow or widower ; (b) an unmarried or incapacitated daughter ; (c) a son under 21 or incapacitated.

Where a person dies domiciled in Scotland different rules apply.

Intestine (Lat. *intestinus*, internal). Part of the alimentary canal (*q.v.*). In the human species the intestines are divided into the small intestine—the duodenum, the jejunum, and the ileum—and the large intestine—the caecum, the colon, and the rectum.

The duodenum, leading directly from the stomach, is from 8 ins. to 10 ins. long and roughly horse-shoe shaped, embracing the head of

the pancreas or sweetbread. Ducts from the liver and pancreas enter the duodenum near the middle. The jejunum and ileum are together about 20 ft. long, the jejunum forming the first two-fifths of the canal, and the ileum the remaining three-fifths. The large intestine, extending from the ileum to the anus, is from 5 ft. to 6 ft. in length. The caecum is the blind commencement of the large intes-



Intestine. Diagram showing construction of the intestinal tube, consisting of the small and the large intestines, each of which is subdivided

tine. Entering it is the vermiform appendix, a small blind tube from 3 ins. to 6 ins. in length and about the diameter of a goose quill. The colon is divided into three parts—the ascending colon which passes up on the right side of the lower part of the abdomen, the transverse colon which lies across the front of the abdomen, and the descending colon which passes down on the left side into the rectum, the last is about 8 ins. in length.

The intestines are almost entirely covered externally by a serous membrane—the peritoneum—which, by its attachments to the back of the abdominal wall, the diaphragm, and other organs, keeps the intestines in their place. Beneath the peritoneum is a layer composed of muscular tissue ; then follows the sub-mucous coat, and lastly, lining the interior of the canal, the mucous membrane. Throughout the small intestine are a number of small glands called crypts of Lieberkühn, and in the duodenum is a further set called the glands of Brunner. Larger crypts of Lieberkühn are also

present in the large intestine. The surface area of the intestinal canal is very large, being increased by the corrugations of the mucous membrane and, in the small intestine, by small projections of tissue known as villi.

The intestines provide a place for the continuation of the digestive processes begun in the stomach and continued by secretions poured into the canal by the intestinal glands and other organs ; and also provide for the absorption of nutritive material from the food as it passes through the intestines—a process assisted by the large surface area of the absorbing mucous membrane. Waste material and undigested food are eventually discharged from the body. These processes are assisted by movements of the intestines. The most obvious of these is a rhythmical muscular contraction which passes along the intestine as a wave and is known as peristalsis. This movement appears to average about an inch per minute. There is also a pendulum or swaying movement which occurs at regular intervals of 5 or 6 secs. which causes a side-to-side movement of the intestines, and helps to mix thoroughly the contents of the canal.

Perforation of the intestine may be the result of ulceration in typhoid fever, tuberculosis, penetrating wounds, and, in the large intestine, of chronic obstruction or cancer. Rupture may follow violent blows, being run over by a vehicle, etc., a condition usually associated with severe shock, pain, and vomiting. Immediate operative treatment is indicated as soon as the diagnosis is clear, the object of the surgeon being to close the wound in the intestine and wash out any blood or intestinal contents which may have entered the abdominal cavity. See Alimentary Canal ; Appendicitis ; Colic ; Colitis ; Digestion ; Dysentery ; Dyspepsia ; Hernia ; Intussusception.

Intonation (late Lat. *intonare*, to sing according to tone). In music, the introductory notes of a plainsong melody ; also, correctness of pitch. For example, if a singer is well in tune, his intonation is said to be good ; just intonation is the agreement of scale-tones and intervals with acoustic laws. See Accent ; Acoustics ; Cadence ; Harmony ; Singing ; Voice.

Intoxication (Lat. *in*, in ; *toxikum*, poison). Literally, the condition of being poisoned. It is used occasionally by medical men to describe the condition caused by

the poisons of infectious diseases, but most often to describe poisoning by alcohol. *See* Alcoholism; Delirium Tremens; Drunkenness.

Intra-Coastal Canal. Inland federal waterway along the Atlantic and Gulf coasts of the U.S.A. Providing a protected channel for barges and light-draft vessels through approximately 2,750 m., it was mostly constructed between 1932 and 1941. Its principal divisions are from Boston to Miami; from Apalachicola Bay, Fla., to the Mississippi at New Orleans; and from the Mississippi to Corpus Christi, Tex. The canal, which has a depth of 12 ft., was built through a right of way 300 ft. wide granted free of charge to the government. It has the subsidiary purposes of irrigation and reclamation.

Intra-Mercurial Planet. Hypothetical planet revolving round the sun in an orbit inside that of Mercury. Such a planet would be difficult to detect because it must necessarily keep close to the sun. It might, however, be seen passing across the sun's disk or during total eclipses. In 1859 Lescarbault claimed to have seen a black circular object crossing the sun in circumstances which led to the naming (Vulcan) of the supposed interior planet, but the observation is now regarded as spurious. In 1878 Watson and Swift claimed to have seen during a total eclipse an intra-Mercurial planet, but this too has never been seen since. Photographs taken during recent eclipses show no object within 12° E. and W. of the sun which cannot be identified as a known star. It is virtually certain that there is no intra-Mercurial planet brighter than the eighth magnitude.

Intrinsic Energy. The internal energy associated with a substance, a definite amount under given conditions. This energy may be partly released if the substance takes part in a chemical reaction. In any reaction the sum of the intrinsic energies of the substances undergoing change is different from the sum of those of the substances formed. If heat is liberated thereaction is exothermic; if absorbed, endothermic.

Introit (Lat. *introitus*, entrance). Portion of a psalm or an antiphon sung at the beginning of the mass. The introit is part of the ordinary of the mass, varying with the seasons and the festivals of the ecclesiastical year, and from early times the masses have been designated by the first words of their

proper introits. In the Church of England the word is employed to describe the psalm or hymn sung by the clergy as they enter the chancel before the Communion service. *See* Mass.

Introjection. A psychological term, meaning the process of taking unconsciously into the mind beliefs or attitudes possessed by persons who are regarded as unquestionable authorities. Children absorb many habits and opinions of their parents, especially while the conscience is being nurtured. In adolescence, what is believed of heroes and favoured causes is taken into the mind in the same way, to be rejected in whole or in part when the hero is discarded. The same mechanism operates in passionate love. Introjection is irrational in character and largely automatic. The only defence against it is reason, which unfortunately is more often used to excuse the opinions arrived at than to modify them.

Intromission (Lat. *intro*, within; *mittere*, to send). In Scots law, term applied to interference or dealing with the property of another. It is either lawful, as when an agent acts on behalf of his employer or a collector on a judgement or order from a court; or vicious, as when someone not duly appointed executor proceeds to deal with the estate of a deceased person. In such a case the intromitter incurs legal liability.

Introvers. Word coined by Jung to describe one of the main psychological types into which he divided humanity. It is contrasted with extrovert. The introvert's interest is turned inwards upon his own thoughts and feelings and he lives predominantly in the world of his own mind. His reactions to his environment are of more importance to him than the environment itself, and he feels little affection for others or concern for their well-being. Fantasy plays a large part in his life. Many artists and mystics are predominantly of this temperament. The extreme type of introversion is found in schizophrenia (a type of mental illness formerly commonly called dementia praecox).

The extrovert is essentially interested in the outside world of reality and finds emotional satisfaction and fulfilment in his relationships with others. Most people have a temperament fairly well balanced between the two extremes, but every gradation occurs.

Introsion Act. Act of the U.S. congress passed May 3, 1807.

It instituted penalties against illegal squatters who did not secure registration, but was not strongly enforced.

Intrusive Rocks. One of three classes into which igneous rocks are divided. They are those rocks which have been forced or injected into veins, fissures, etc., beneath overlying rock masses.

Intuition (Lat. *intueri*, to observe, contemplate, consider). The mental process of apprehending the truth of things without reasoning or analysis, of forming a hypothesis, or in popular terms of jumping to a conclusion. Intuition is in fact often based on knowledge or experience; but sometimes it occurs without any easily explainable basis.

Intuitionism is the doctrine that there are certain truths which are immediately apprehended without the exercise of reason. Ethically it is the doctrine, of which James Martineau is the chief exponent, that man has an intuitive apprehension of moral values. Moral judgement is based upon "the inner springs" of an action.

Intumescence. Property possessed by some substances, when heated, of swelling, bubbling, and spurting out, sometimes violently. Minerals which fuse with intumescence generally contain some volatile constituent, often water.

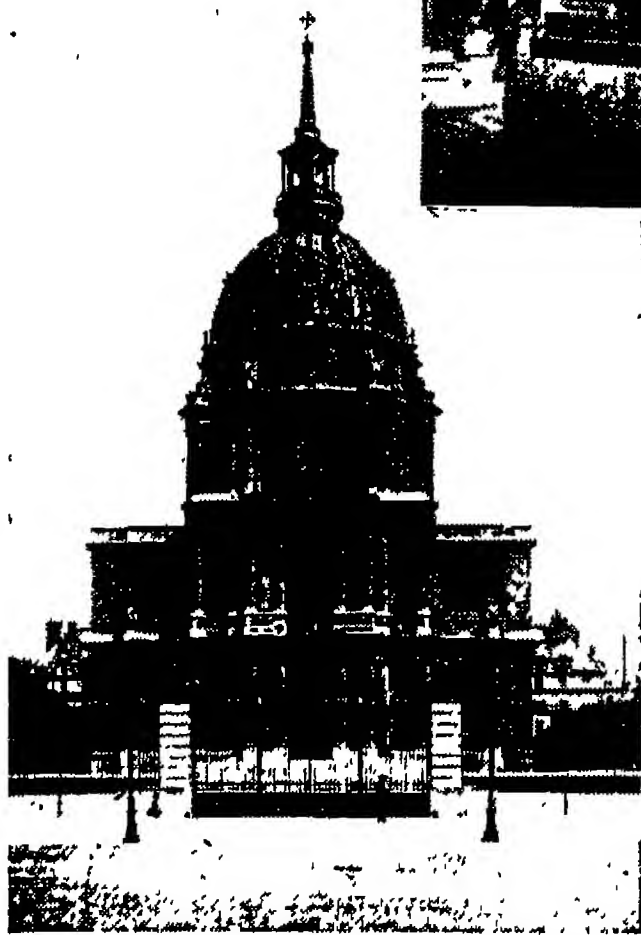
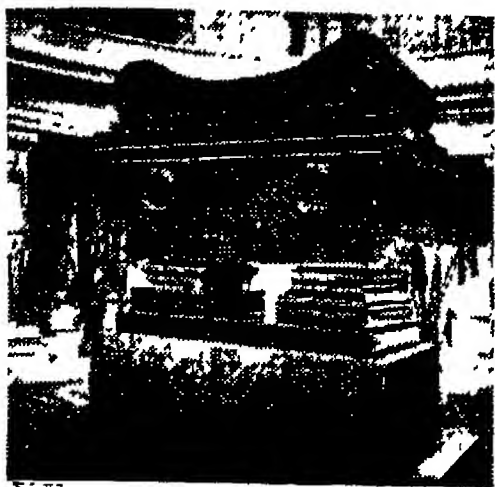
Intussusception (Lat. *intus*, within; *suscipere*, to take up). Medical term for the infolding of one part of the intestine into another. The condition occurs most frequently in male infants under two years of age. It comes on suddenly with severe pain, followed by vomiting and often by diarrhoea. If the condition is not promptly relieved the patient will die in 24 hours to a week.

The normal position of the bowel can sometimes be restored by inflating the intestine with air or injecting an enema; but nearly always immediate operative treatment is required. A chronic form may occur in the aged.

Inulin. Substance resembling starch in appearance, and first prepared by Rose in 1804 from the roots of elecampane (*Inula helenium*). Dahlia tubers contain 10 p.c. of inulin and this carbohydrate is obtained from them.

Invalides, HÔTEL DES. French institution for wounded soldiers. Established by Louis XIV in 1670, the building was designed by Libéral Bruant and erected at the N.W. of the Champ de Mars.

Paris. Napoleon re-endowed the institution in 1811, providing for about 7,000 wounded soldiers, but the numbers residing there since then are very much smaller. The hôtel proper is built round a large quadrangle and



Hôtel des Invalides, Paris, containing Napoleon's sarcophagus (top)

contains a magnificent collection of armour and weapons and a comprehensive Napoleonic collection. At the rear is the dome, built by Mansart in 1693, for a royal mausoleum. The remains of Napoleon, brought from St. Helena in 1840, were deposited here in a porphyry sarcophagus in 1861. See Napoleon; Paris.

Invasion (Lat. *in*, in; *vadere*, to go). Act of an army in forcibly entering a country. It may precede a declaration of war, when it is a *casus belli*, or may follow one. See International Law; War.

INVASIONS OF BRITAIN. Throughout history numerous attempts have been made to land troops on the British mainland, but most of them, notably those of the Saxons in the 4th century and of the Danes in the 8th-9th centuries, were merely long series of large-scale raids, the invaders never attacking in great strength. Those who did establish themselves were unable to do more than set up small communities which gradually were assimilated by the rest of the population, though the intruders ultimately had considerable influence on the country's social life.

The first large scale invasion of the island was that led by Julius Caesar in 54 B.C., after a "reconnaissance raid" the preceding

year. He retired without effecting a conquest, being succeeded by Aulus Plautius (A.D. 43). But the Britons were not finally dominated until A.D. 62. (See Britain.) Roman rule was established over the greater part of the country for nearly 400 years. The next and the last successful invasion was by William of Normandy in 1066

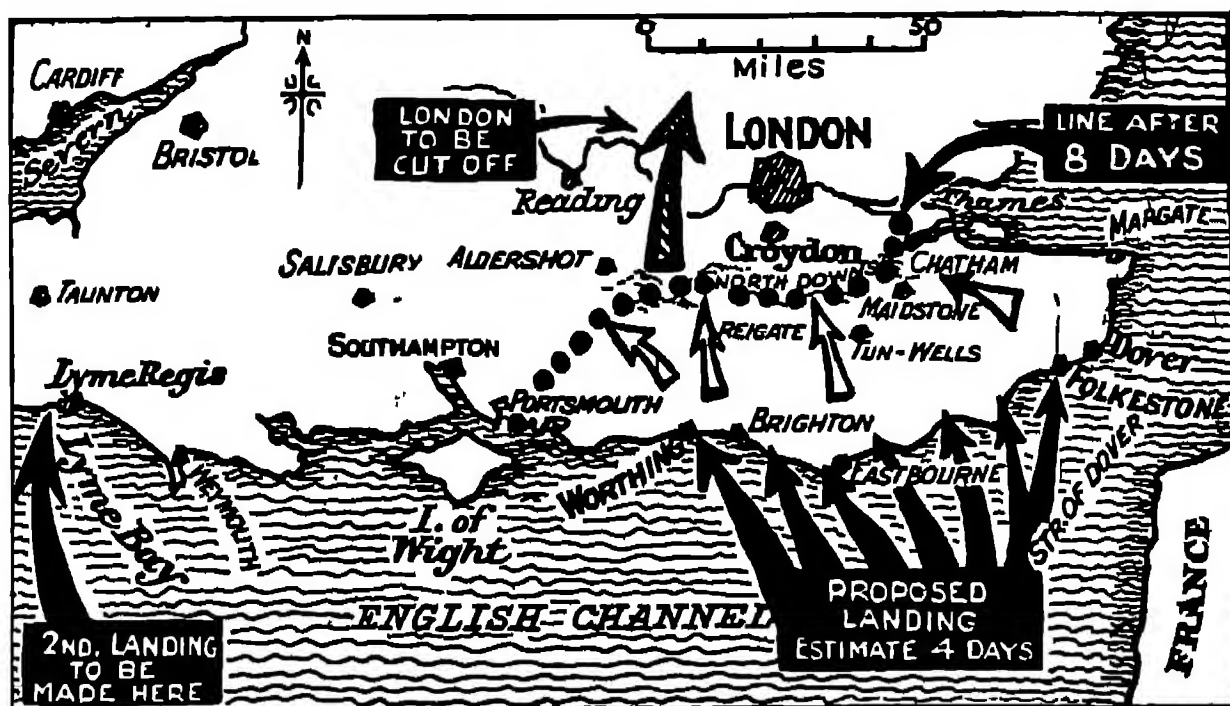
(the Conquest). Shortly after the third truce (1377) of the Hundred Years War, the French effected a landing in Sussex, and in 1403 sent out a fleet which sacked Plymouth. In neither case was any attempt made to establish permanent occupation. In 1588 Philip of Spain sent his Armada (*q.v.*) with the object of putting a Spanish army ashore in England, but the fleet was defeated, and no one landed except survivors from galleons wrecked on the English, Scottish, and Irish coasts. During the Napoleonic wars the French assembled a powerful army at Boulogne and concentrated ships for the invasion of England and eventual occupation of London, but only small raids were carried out; at Fishguard, Pembrokeshire, in Feb., 1797, Col. Tate, an Irish-American in the French service, landed with 1,200 men, but was defeated by the local militia.

After the defeat of France by Germany in 1940 and the evacuation of the British army from the Continent, the German high command seriously considered putting into operation an organized plan for the invasion of Britain. Known as operation Seelöwe (sea lion), the project was based on a landing

by two armies, totalling 25 divisions, between Folkestone and Worthing. Ten divisions from the French coast were to go ashore on the first four days to form the initial bridgehead, which was to provide the base for an encircling movement designed to isolate London and the south. A second landing was to be made at Lyme Regis with Bristol as its objective and to link with the first invaders N. of London. An air offensive was to have begun on Aug. 13, but the seaborne invasion was not to start until Sept. 15. The date was then postponed until Sept. 21. Thence until the spring of 1942 the Germans fixed four separate dates for invasion, but the defeat of the Luftwaffe, the growing military strength of the U.K., and unimpaired British sea power made an attempt impracticable. Consult Invasion 1940, P. Fleming, 1957. For the Allied invasions of the European mainland, 1943-44, see D-day; Italy Campaign.

Invention and Research, BOARD OF. Organization formed in July, 1915, to assist the British Admiralty in stimulating scientific effort in the First Great War. A similar department was later set up by the ministry of Munitions to examine any invention or method likely to be useful. After the armistice in 1918 a commission was appointed to determine what awards and royalties should be paid to inventors. The commission did not complete its work until 1945, and the awards for inventions ranged from £1,000 to £110,000.

During the Second Great War the ministries of Supply and of the three fighting services maintained committees to examine inventions. In 1947 a royal commission began hearing claims for inventions adopted. They totalled £3,000,000 and amongst the first 50 claimants



Invasion. Map showing the German plans for the invasion of Great Britain on the south and south-east coasts, 1940-1942

Courtesy of the Daily Telegraph

were the inventors of the Mulberry harbour, Bailey bridge, plastic armour, sticky bomb, flail tank, and amphibious tank.

Inventory (Lat. *invenire*, to come upon). Term used in English law and business for a detailed list of goods and chattels. Such a list is commonly made out by an executor or administrator, and in some systems of law an executor is bound to make one at the earliest possible moment. An inventory is also attached to a bill of sale to identify the goods and chattels that are mortgaged thereby.

Inveraray. A royal burgh and the co. town of Argyllshire, Scotland. It stands on a small bay of Loch Fyne, just where the Aray enters it, and is about 60 m. by road N.W. of Glasgow. The chief industry is the herring fishery, but the burgh is best known for its connexion with the Campbells. It was founded by a Campbell on the opposite side of the bay and was made a burgh in 1474. The chief buildings are the parish and other churches, the court house, and a reading room. There is an old and beautiful market cross and a memorial to the Campbells who were hanged for their share in the rising of 1685. The nearest railway station is at Dalmally, 16 miles away. Outside the town is Inveraray Castle, seat of the duke of Argyll; built in the 19th century, it replaced an older structure. It is a quadrangular building with a tower at each corner, and stands in an enormous park. Near the

of a tower which is both landmark and viewpoint. The public gardens divide the town into N. and S. portions. Government buildings are on a large scale, while there are a town hall and theatre. Bluff is the port, but Invercargill has a second harbour for smaller vessels. It is supported by a rich agricultural and pastoral district and a timber trade. There are rope, twine, and carriage factories, sawmills, brick and pottery works, iron foundries, motor engineering works, and breweries. Pop. (1951) 26,775.

Inverchapel, ARCHIBALD JOHN KERR CLARK KERR, BARON (1882-1951). British diplomatist. Born March 17, 1882, and educated privately, he entered the diplomatic service in 1906, serving at Berlin, Buenos Aires, Washington, Rome, and Teheran before being appointed minister to the Central American republics in 1925. He was transferred to Chile, 1928; to Sweden, 1931; and was ambassador in Bagdad, 1935-38; in China, 1938-42; and in the U.S.S.R., 1942-46. Then he went to Indonesia as conciliator between the Netherlands government and the Indonesian republican leaders. In 1946 also he was appointed ambassador to



Lord Inverchapel,
British diplomatist

partners retired he became the head of the firm. In addition he developed the steamship service between Glasgow and Ireland. He was created a peer in 1897, and died on Feb. 12, 1901. James Cleland Burns, 3rd baron (1864-1919), succeeded to the title in 1905. He was associated with the firm of G. and J. Burns for 34 years, and after the death of his brother was chairman. He was a director of Cunard and deputy-chairman of the Clydesdale bank. Dying Aug. 16, 1919, he was succeeded by his only son, John Alan Burns (1897-1957), 4th baron, who in 1929 married, as his second wife, the actress June (Howard-Tripp), from whom he obtained a divorce in 1933. On his death without an heir the title became extinct.

Inveresk. Parish and village of Midlothian, Scotland. It stands on the river Esk, 6½ m. E. of Edinburgh. The parish contains Musselburgh, and the battlefield of Pinkie, 1547, is near. Industries are fishing, net and paper making. There are wire mills. Pop. (1951) parish, 21,494.

Inverforth, ANDREW WEIR, 1st BARON (1865-1955). British merchant. Born at Kirkcaldy, April 24, 1865, he entered a shipping firm in Glasgow. After a time he established the business of Andrew Weir and Co., shipowners and merchants, and made a large fortune. He entered public life in 1917 as surveyor general of supply at the War office, and was minister of munitions, 1919-21. Raised to the peerage in 1919, he died Sept. 17, 1955.

Invergordon. Police burgh and chief seaport of eastern Ross and Cromarty, Scotland. It is on the north shore of Cromarty Firth, 13 m. N.E. of Dingwall, and is the centre for an agricultural belt. It has good road and rly. connexions. A naval base and fuel oil depot, during the Second Great War it was also a flying boat base. The firth offers excellent anchorage through the year, and the harbour can take ships up to 35,000 tons. Pop. (1951) 1,514.

In Sept., 1931, when the fleet was assembled here for manoeuvres, some unrest occurred among the ratings, a result of threatened pay cuts arising out of the economic crisis of that year (see under Lord May); this incident was reported, and remembered, as the Invergordon mutiny.

Inverkeithing. Royal burgh of the county of Fife, Scotland. It stands on a bay on the N. side of



Inveraray, Argyllshire. An evening study on Loch Fyne with the town reflected in the calm waters

town is the curious conical hill of Duniquoich. Pop. (1951) 503.

Inverbervie. Royal burgh and resort of Kincardineshire, Scotland, at the mouth of the r. Bervie. It has spinning mills and salmon and trout fisheries. It was made a royal burgh in 1342. Pop. (1951) 885.

Invercargill. A city of New Zealand, on Waihopai estuary, South Island, 17 m. north of Bluff. The water supply is obtained from artesian water pumped to the top

the U.S.A. and raised to the peerage; he had been knighted in 1935. He retired in 1948, and died at Greenock, July 5, 1951.

Inverclyde, BARON. A title borne by the family of Burns since 1897. John Burns (1820-1901) was educated at Glasgow university, and became associated with the Cunard Steamship Co., of which his father, Sir George Burns, 1st baronet, David McIver, and Samuel Cunard (q.v.) were the founders. When the original

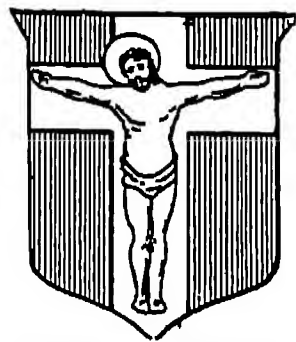
the Firth of Forth, 13 m. N.W. of Edinburgh. Its church, an old foundation, was rebuilt after a fire in the 19th century. This was a royal burgh in the 12th century. A port, Inverkeithing is in the Rosyth area; its industries include shipbreaking, paper making, stone quarrying, and the making of plastic garments. Pop. (1951) 3,695.

The battle of Inverkeithing, fought about 2 m. from the town, took place on July 20, 1650, Cromwell's troops defeating the Scottish adherents of Charles II.

Inverlochy. Village of Inverness-shire, Scotland. It stands on the Lochy near where it enters Loch Linnhe, 1 m. N.E. of Fort William. Near the village is a ruined castle. Here, Feb. 2, 1645, the marquess of Montrose defeated the Campbells. He had just ravaged Argyllshire and was returning to Aberdeen, followed by an army under the earl of Argyll. Towards Inverlochy, although he had only 1,800 men, he made a night march through the Grampians and routed his opponents. It is said that the Campbells and their allies had 1,700 slain. The battle is described in The Legend of Montrose.

Invernairn, WILLIAM BEARDMORE, BARON (1856-1936). British merchant. Born at Greenwich, Oct. 16, 1856, and educated at Glasgow high school and Ayr academy, he entered his father's shipbuilding firm of William Beardmore and Co., and became head of it in 1886. Under his management the firm grew in size and importance; during both Great Wars it manufactured all forms of armaments, also ships, aircraft, and tanks. The dirigible R34 was completed by the firm in 1919. Beardmore was knighted in 1914, and in 1921 became Baron Invernairn. He died April 9, 1936.

Inverness. Royal burgh of Inverness-shire, Scotland. It is also the county town, a seaport, and a market town, and the ancient capital of the Highlands. It stands on both banks of the Ness, near where that river enters the Moray Firth, 100 m.

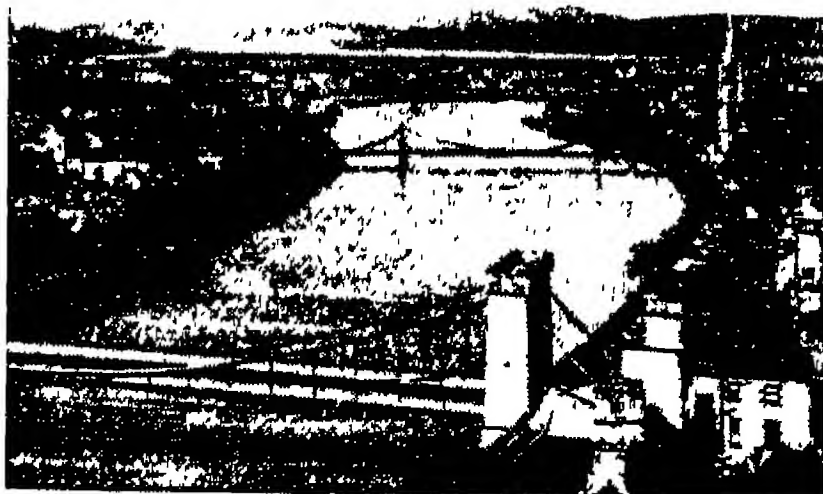


Inverness arms

W.N.W. of Aberdeen, and adjoins the Caledonian Canal. There is an airport at Dalcross with services to Orkney, Shetland, and Stornoway.

The buildings include the episcopal cathedral of S. Andrew, a modern edifice, the town hall,

several churches, and the 19th-century castle on Castle Hill, containing some of the county offices and the court house. The mercat cross is near the town hall, as is the old clach-na-cuddain, or stone of the tubs, on which those bringing up water from the Ness used, according to



Inverness. The town and river Ness; upper picture, the cathedral from Castle Hill

tradition, to rest their tubs. The cemetery stands on the hill of Tomnahurich and there are several public parks.

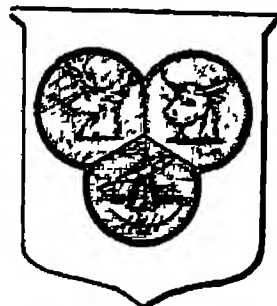
Inverness, once the headquarters of the old Highland rly., has railway workshops. Other industries are distilling, tanning, engineering, and the manufacture of woollens and welding machines. It has a large trade in cattle and agricultural produce generally. A Highland gathering is held in August.

Inverness was the capital of the Pictish kingdom, and, because of its strategic position, was a place of importance under the early kings of Scotland. In the 11th century or thereabouts a castle was built for its defence. It was made a royal burgh about 1180, and the castle was the scene of many stirring events. There was a Dominican abbey here in the Middle Ages. The burgh was occupied in 1745-46 by Charles Edward and the Jacobites. Market days, Tues. and Fri. Pop. (1951) 28,107.

Inverness-shire. The largest county of Scotland. It is bounded N. by Ross and Cromarty and S. by Perthshire and Argyllshire, with the cos. of Nairn, Moray, Banff, and Aberdeen to the E. It comprises two portions, the mainland, traversed N.E. to S.W. by Glen More, which contains the Caledonian Canal, and the insular division, which embraces Skye, Harris

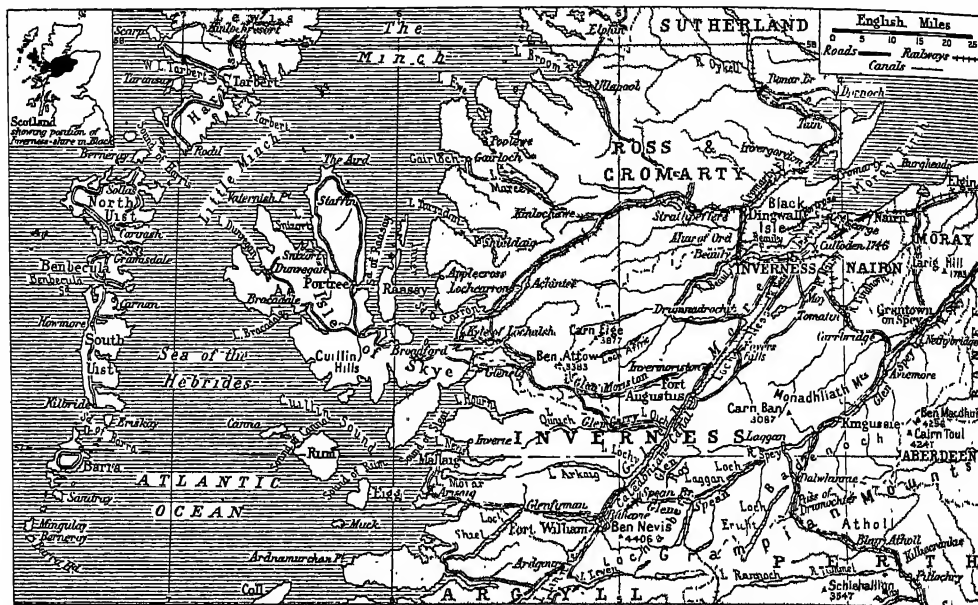
N. and S. Uist, Benbecula, Barra, Raasay, Rum, Eigg, St. Kilda, and a number of smaller islands. The

mainland is highly mountainous and contains Ben Nevis, 4,406 ft., and many other heights above 3,500 ft. The valley and loch scenery is extremely beautiful. Numerous lochs include Ness, Oich, Lochy, Arkaig, and Shiel. The principal valleys are the Glens More, Garry, Moriston, Spey, Spean, and Roy. The coast is deeply indented by sea-lochs. The chief rivers are the Spey, Ness, and Beaully. Little of the soil is under cultivation, and the land is covered mainly by deer forests and moors abounding in grouse and other game. Hill sheep farming is the leading industry, followed by fisheries, distilling, tourism, forestry, hydro-electricity, weaving in the Outer Isles, cattle rearing in the Beaully valley and at the S.W. end of the Great Glen, and the processing of aluminium. Railways, roads, and the Caledonian Canal provide transport facilities. Inverness, the county town, Fort William, and Kingussie are the largest towns. Inverness-shire (except those islands that are within the Western Isles constituency) forms a co. constituency. Area 4,211 sq. m. Pop. (1951) 84,930.



Inverness-shire arms

LITERARY ASSOCIATIONS. The co. is the background of the stories of Bruce and of the 'forty-five. It features in Scott's The Lord of the Isle and The Legend of Montrose, and in his diary of a yachting tour of the islands. These islands inspired the famous anony-



Inverness-shire. Map of the largest county in Scotland, with its outlying islands. The county is traversed by the Caledonian Canal, which obviates the passage round the North of Scotland

mous Canadian boating song, and much about them and the mainland will be found in Johnson's *Journey to the Western Highlands of Scotland*. Burns's associations are recorded in his lines on the waterfall at Foyers and his song, *The Lovely Lass of Inverness*. At Achnacarry, Lochiel first displayed the Stuart flag in 1745, and received the warning recorded in Campbell's poem.

Inverse Square Law. General law of physics. It connects the intensity of effect produced at any point with the distance of this point from the centre of influence. For example, the gravitational attraction between two bodies of masses m_1 and m_2 respectively, and distance d apart is proportional to $\frac{m_1 m_2}{d^2}$ i.e. it varies

inversely as the square of the distance. The same law applies to forces between electric charges and magnetic poles; to the intensity of sound waves at a distant point; to the intensity of illumination of a surface, etc.

Inversion (Lat. *invertere*, to turn about). In music, a chord is inverted when its root is no longer the lowest note. The first inversion has its third in the bass; the second has the fifth, etc. Inverted intervals change their character, unless they are perfect intervals, e.g. a major 3rd becoming a minor 9th, and an augmented 4th a diminished 5th.

In mathematics, if from a fixed point O a line is drawn cutting a curve in a point P , and a point P' is determined on OP such that $OP \cdot OP' = a$ constant, the locus of P' is called the inverse of P , and the process inversion.

Meteorologically, an inversion is said to exist when the temperature of the air, which normally becomes less, increases with height. On calm, clear nights inversions often form in the lowest 200–300 ft. of the atmosphere. Fogs on land, especially dense winter ones, usually imply the presence of an inversion. Overhead fogs in which smoke particles are caught up, producing gloomy conditions, are due to inversion layers. At the lower boundary of the stratosphere there is generally a slight inversion before the isothermal region is reached.

In English literature, inversion of the normal order of words to produce an effect is often considered bad style, although examples abound in the *Authorised Version*, e.g. "great was the fall thereof." The device in poetry assists metre and scansion.

Invertase. The name originally applied to the enzyme which catalyses the conversion of cane sugar into a mixture of dextrose and levulose. The name was coined because the mixture formed rotates the plane of polarised light to the left, whereas cane sugar rotates it to the right, the action

of the enzyme thus causing an inversion of direction. The enzyme is now usually called *sucrase*.

Invertebrate (late Lat. *invertebratus*, unjointed). Name applied to those classes of the animal kingdom which do not possess the characteristic and essential features of vertebrate or chordate animals. The central nervous system is neither dorsal nor tubular; there is no notochord or backbone; there are no gill-slits in any stage; the eye is usually an outgrowth of the skin, and not of the brain; and there is no ventral heart. The principal classes, proceeding downwards, are molluscs, arthropods, echinoderms, worms, coelenterata, sponges, and protozoa. See *Animal*.

Invert Sugar. A variety of sugar which turns a ray of polarised light to the left instead of the right, as does ordinary cane sugar. It is prepared by heating sugar solution with dilute acid or by the action of an enzyme. It is chiefly used in the brewing industry to improve the keeping properties of beer, and to replace part of the malt. See *Sugar*.

Investigator Strait. Channel between Kangaroo Island and Yorke Peninsula, South Australia. It is 25 m. across, and is the outlet of St. Vincent Gulf to the ocean.

Investiture. In feudal custom, the act of installation of a vassal by his superior lord. The investiture was symbolised in early times

by the suzerain handing to the vassal some object, such as a standard or piece of turf. Later the many varying customs became regularised, and the sword and sceptre were generally adopted.

Round the question of investiture was centred one of the great medieval controversies of Church and state. As the holding of lands by the Church all over W. Europe increased, the precise status of ecclesiastical holders in the feudal system became more difficult of definition. Bishops and abbots became not only suzerain themselves, delegating their benefices to lay vassals, but became in turn vassals of the great lay princes. The princes found in this relationship an opportunity to exercise over the ecclesiastical body an influence which the Church could only regard as prejudicial to her own claims of supremacy. Gradually the claim was asserted by the lay princes that by investiture they themselves conferred rights of spiritual as well as temporal jurisdiction, and they took to themselves the absolute right of disposal of abbacies, bishoprics, etc., ignoring the old rights of election. The result was the growth of corruption and simony, which the papacy made several efforts to check, notably by the Lateran decree of 1059, forbidding the clerical acceptance of any office from lay hands.

The Church and the Monarchs

Pope Gregory VII brought the issue to a head, forbidding the emperor Henry IV to grant any ecclesiastical investitures, Feb., 1075. Henry's disobedience brought war, and ultimately his submission at Canossa, Jan. 28, 1077. The principle was confirmed by Urban II in 1090. In England the rights of investiture, contested by Anselm, were finally renounced by Henry I in 1107. The emperor Henry V succeeded his father in 1106, and renewed the old claims. In Feb., 1111, Henry made renunciation of them at Rome, but three days later revoked and arrested Paschal II, who, under duress, temporarily abandoned his position. The Council of Vienne, 1112, declared lay investiture of clerics to be heresy, and other prohibitions were made in 1116 and 1119, but little was effected until the concordat of Worms, signed Sept. 8, 1122. By this the emperor yielded the actual investiture by ring and staff, but retained his feudal rights over the actual ecclesiastical lands, a compromise ratified by Calixtus II. See Acco-

lade; Anselm; Feudalism; Gregory VII; Papacy.

Invincibles. Name given to an Irish secret society which existed about 1880-85. It consisted of the more violent Fenians, and its aims were the murder of persons in authority, landlords, and all upholders of law and order. They were responsible for the Phoenix Park murders (*q.v.*), and for many other crimes and outrages about 1882. See Carey, James; Fenianism.

Invisible Exports, INVISIBLE IMPORTS. Terms denoting the value of commercial services rendered by one country to another. These, though they cannot be seen or expressed in terms of weights and measures, earn a right to payment similar to that resulting from the export and import of visible goods. Thus, in addition to value of the visible goods exported by Great Britain, that country has additional income arising from (a) the freight earned by British ships when carrying foreign cargoes; (b) dividends and interest receivable by British holders of dominion, colonial, and foreign investments; (c) commissions payable by people abroad to British banks, insurance companies, shipping agents, etc.; (d) expenditure in the U.K. by visitors from abroad; (e) royalties on British films shown abroad; (f) royalties from abroad on patents, copyrights, etc., belonging to people in the U.K.; (g) sales of second-hand ships and other goods not cleared through the customs as exports; (h) emigrants' remittances home; (j) expenditure by foreign governments on diplomatic and consular services in the U.K. All such items create indebtedness of other countries to the U.K. as real as the receipt by them of goods. Conversely, U.K. payments of this kind are her invisible imports.

In 1937 the U.K.'s net invisible exports (*i.e.* when the total of her invisible imports had been subtracted from them) were estimated to amount to £330,000,000 (shipping £95,000,000; investments, £195,000,000; commissions, £30,000,000; other, £10,000,000). In 1946 they were estimated at only £120,000,000 (shipping, £10,000,000; investments, £80,000,000; other, £30,000,000).

Invisible Man, THE. Imaginative romance by H. G. Wells, published 1897. The story of a scientist who succeeded in making himself invisible, but was unable to reverse the process, it was made into an American film in 1934.

Invoice (Fr. *envoyer*, to send). Commercial term for the statement sent by a vendor to a buyer with the goods sold to him. It should give full particulars of the quantity and price. When goods are sent abroad it is sometimes necessary to have the invoice signed by the consul of the country to which they are being dispatched, in order to facilitate the payment of the import duties. See Book-keeping.

Involution (Lat. *in*, upon; *volvere*, to roll). In geometry two sets of points are said to be in involution when there is a certain relation or correspondence between them. If a series PP', QQ', RR', etc., are chosen on a line, and O is a point, such that $OP.OP' = OQ.OQ' = OR.OR'$ etc., the points constitute an involution of which O is the centre. See Conic Sections.

Io. In Greek mythology, daughter of Inachus, king of Argos. She was beloved of Zeus, who, to protect her from the jealousy of



Io and Argus, from a fresco in the temple of Augustus, Pompeii

his wife Hera, changed her into a heifer. Hera obtained possession of the heifer, and set the hundred-eyed monster Argus to guard her. Zeus, however, sent Hermes to kill Argus, whereupon Hera sent a gadfly to torment Io. Still in the form of a heifer, she wandered far and wide, and until finally she reached the banks of the Nile, where her prayer to be restored to human form was granted, and she brought forth Epaphus, her son by Zeus. Io is supposed to be the moon wandering in the starry sky represented by the hundred-eyed Argus, while her change into a heifer is a symbol of the crescent moon.

Io. Satellite of Jupiter, nearest of the four discovered by Galileo in 1610. It is 2,400 m. in diameter and revolves at a mean distance

of 262,200 m. from the planet in a period of 1 day, 18 hrs., $27\frac{1}{2}$ mins. Its density (2.7 times that of water) suggests that it is a mass of rock.

Iodic Acid (Gr. *iodēs*, violet-like) (HIO_3). Acid prepared by boiling together one part of iodine with ten parts of concentrated nitric acid. The iodine is dissolved and iodic acid is deposited in crystals. It is also formed when chlorine is passed into water in which powdered iodine is suspended. Iodic acid forms poisonous iodates with alkalis, but potassium iodate occurs as a by-product in potassium iodide.

Iodides. Salts of hydriodic acid. Iodides of most of the elements are known. Metallic iodides are obtained either by direct union of iodine with the metal or metallic oxide, or by dissolving the metal in hydriodic acid. Most are insoluble in water, but lead iodide dissolves in hot water, and when the solution cools is deposited in brilliant yellow scales. The insoluble iodides are mostly of a pronounced colour, e.g. mercuric iodide, a brilliant scarlet, mercurous iodide, green, and silver iodide, lemon-yellow.

Iodide of nitrogen, a dark-brown powder obtained by adding iodine to excess of solution of ammonia, is violently explosive. All iodides are decomposed with the formation of iodine, by chlorine and bromine, and on heating strongly alone or with sulphuric acid. Most are employed in medicine, and silver iodide is used in photography in combination with other silver halides.

The medicinal taking of iodides over too long a period may temporarily cause the condition known as iodism, with sore throat, patchy skin eruption, running nose, inflamed gums, etc.

Iodine. Non-metallic element, belonging to the same group as fluorine, chlorine, and bromine in the periodic table. With chemical symbol I, atomic number 53, and atomic weight 126.92, it was discovered in 1811 by Courtois of Paris during his extraction of sodium carbonate from seaweed ash. A dark, lustrous, crystalline solid which changes to a rich violet vapour on heating, iodine is found widely distributed throughout nature, but only in small quantities and never in the free state. Combined with other elements into simple inorganic salts or complex organic compounds, iodine is present in soils and waters and in all marine and land plants and animals. In higher animals it is

especially concerned with the functions of the thyroid gland.

The chief commercial source is caliche, the crude nitrate-bearing earth occurring in vast deposits in the desert regions of N. Chile. Originally present as calcium iodate, iodine is precipitated in elemental form by sodium bisulphite from the mother liquors from which nitrate of soda has previously been extracted. Seventy-five per cent of the world's annual requirement of about 1,200 tons of iodine is met from this source. The remainder is obtained from seaweed and underground waters of deep oil-well borings and mineral springs in California, Java, Russia, and Italy.

Iodine has been used extensively in medicine as an antiseptic and germicide, especially in skin lesions, though of recent years there has been a tendency to substitute less irritant substances. It is, however, useful as a counter-irritant to relieve pain, and various compounds are prescribed for goitre, leprosy, dysentery, and some forms of arthritis. There are numerous uses also in veterinary practice. Iodine is also used as a catalyst in the chemical industry; and it is used in the manufacture of some dyes and heat-sensitive paints. Silver iodides are important in photography, and methyl iodide is used to put out petrol fires.

Iodoform or **TRIIODOMETHANE** (CHI_3). Lemon-yellow solid, with a persistent saffron-like odour. Discovered in 1822 by Sérullas, it is made by heating a mixture of caustic alkali or alkali carbonate and a dilute solution of alcohol or acetone in the presence of iodine.

On a larger scale iodoform is prepared by electrolytic methods from a solution of an alkali iodide in dilute alcohol or acetone, fresh alcohol and iodide being added as fast as the iodoform is deposited. Iodoform, an antiseptic, has been replaced by odourless substitutes.

Iolanthe, OR THE PEER AND THE PERI. Comic opera written by W. S. Gilbert and composed by Arthur Sullivan. It was produced Nov. 25, 1882, at The Savoy, where it ran for 398 performances. An extravaganza in which the fates of fairies, headed by the

Fairy Queen, are unconsciously linked with those of members of the house of lords, headed by the lord chancellor, the piece finds much of its humour in politics, and Palace Yard, Westminster, is the scene of the second of the two acts. There is sung the sentry's famous song on the theme that "every boy and every gal that's born into this world alive is either a little Liberal or else a little Conservative." Other memorable songs include The House of Peers, A Highly Susceptible Chancellor, The Nightmare, and the mock-magnificent Peers' Chorus.

Iolaus. In Greek mythology, the faithful companion and charioteer of Hercules. He assisted the hero in the slaying of the Lernaean Hydra, and helped his children in their fight for the Peloponnese, killing Eurystheus in battle. According to another legend, he had by this time died, and was permitted by the gods to return from the lower world for the express purpose of assisting the children of Hercules.

Ion. In Greek mythology, legendary founder of the Ionian race. He was the son of Apollo by Creusa, wife of Xuthus. On reaching manhood he narrowly escaped being unwittingly poisoned by his mother. The legend forms the theme of Euripides' play, *Ion*.

Ion. Charged particle which appears during electrolysis. The theory of positive and negative ions is discussed under Ionisation.

Iona. Island of Scotland. One of the Inner Hebrides, it is part of the county of Argyll, lying off the S.W. peninsula of Mull. Its length is about $3\frac{1}{2}$ m. and breadth $1\frac{1}{2}$ m.;

it has an area of about 2,200 acres. The village of Iona is on the E. of the island, the W. coast having precipitous cliffs. The few inhabitants



Iona, Scotland. W. front of the restored cathedral, with Celtic cross. Top left, the cathedral from the S.W.

keep sheep and cattle and grow barley, potatoes, and oats, while some are employed in fishing.

Iona, also called Hy, Hii, and Icolmkill, is the Mecca of Scottish Christianity and was previously a Druid centre. Here S. Columba landed from Ireland and founded a monastery, 563, from which monks went out to convert the Picts and Scots. Later a Benedictine monastery and nunnery were founded on the island. On it also is the Reilig Oiran, a cemetery in which lie the remains of Scottish, Irish, and Norwegian kings.

In the 9th century Iona was made a bishopric, which was later in the province of Trondhjem, Norway having at that time rights over the Hebrides. This bishopric became extinct, but about 1507 a new one was created, that of the Isles. The abbey church of S. Mary, a 13th century edifice, was made the cathedral. This was destroyed at the Reformation and the site was long the property of the dukes of Argyll. The 8th duke presented the ruins to the Church of Scotland, and, partly restored, the cathedral was reopened in 1905. There are remains of the nunnery and the chapel of S. Oiran, also crosses, tombs, and other memorials of the past. *See Hebrides; consult also The Story of Iona, E. C. Trenholme, 1909.*

Ionian. Ancient district of Asia, so called from having been colonised by Greeks of the Ionian branch of the Hellenic race. According to tradition, which modern research tends to confirm, the colonists came from Attica about the 11th century B.C.

They settled on a strip of land on the Aegean Sea about 100 m. long, with Lydia as a hinterland, and in the islands of the Cyclades. Their twelve principal cities, Miletus, Myus, Priēnē, Samos, Ephesus, Colophon, Lebedus, Teos, Erythrae, Chios, Clazomenae, and Phocaea, were united in confederacy with the Aeolic city of Smyrna (now Izmir), with a common sanctuary called the Pan-Ionian on Mt. Mycalē, opposite Samos. The Ionian cities suffered severely from the Cimmerian invasion about 700 B.C., but maintained their independence against the rising power of Lydia until the time of Croesus (c. 550), when they were forced to submit. With the overthrow of Croesus by the Persians they passed under the dominion of the latter.

Their revolt about 500 led to the great wars between Persia and Greece, at the end of which in

479 they became allies of Athens. Nearly a century later Ionia again became subject to Persia, until the conquest of the Persian empire by Alexander the Great, and after a period under Macedonian rulers eventually became incorporated in the Roman prov. of Asia. Even under Persian rule the Ionian cities were highly prosperous, and the birthplace of philosophy, science, and history. *See Greece.*

Ionian Islands. Islands of Greece in the Ionian Sea, off the W. coast of Greece. They consist of Corfu (Kerkyra), Kefalinia (Cephalonia), Zakynthos (Zante), Levkas (Leucadia), Ithaca, and a number of islets. Total area 860 sq. m. Pop. (1951) 228,597. Mountainous, they rise to 5,000 ft., in Kefalinia, but there is good soil which produces grapes, currants, and olives.

Corfu and Kefalinia are the largest and most populous. Corfu, on the E. side of Corfu island, is the chief town.

The islands played their part in Greek history. In the Middle Ages they belonged to Venice. In 1815 they passed under British protection, and in 1864 were ceded to Greece. A prolonged series of earthquakes and subsequent fires in 1953 wrought disastrous havoc in Kefalinia, Zakynthos, and Ithaca. All the towns of Kefalinia, including the capital city and seaport of Argostoli and the seaport of Lixuri, were laid in ruins. Zakynthos, capital and seaport of Zakynthos island, was also completely destroyed. Vathy, capital and seaport of Ithaca, was devastated by tidal waves. Over 1,000 lives were lost, some 11,000 people were injured, and thousands of families were rendered destitute.

Ionian Mode. In music, a church mode, beginning on C and using only the natural notes, i.e. the white keys of the pianoforte. The scale was



with G as its dominant. The Ionian mode therefore corresponded to the modern major scale. *See Mode; Scale.*

Ionians. One of the three principal branches of the ancient Greek race, speaking a dialect distinct from Aeolic and Doric. Traditionally they were the descendants of Ion (q.v.). The name Ionian was applied to the inhabitants of Attica and Euboea, to the

Ionian colonies of Asia Minor, and to offshoots from these.

Ionian Sea. Part of the Mediterranean, the ancient Mare Ionium. Communicating with the Adriatic by the Strait of Otranto and encircling the Ionian Islands, it lies between Greece on the E. and Italy on the W. A notable feature is the long arm, called on the W. the Gulf of Patras and on the E. the Gulf of Corinth, which stretches E. across Greece, separating, but for the narrow isthmus of Corinth, the Morea from the N. and larger portion of the country. By contrast with the shallow Adriatic to the N. the Ionian Sea is deep, forming the N.W. portion of the eastern or Levantine basin of the Mediterranean.

Ionic Order. The second of the three orders in Greek architecture. It is more slender and graceful than the Doric order; the fluting of the column is finer, and its square capital is easily distinguishable from both the Doric and the Corinthian examples by its volutes or spirals. The mouldings of the entablature also are more delicate. *See Architecture; Greek Art and Architecture.*

Ionisation (Gr. *iōn*, going). Process by which atoms or molecules gain or lose electrons and become charged particles. A salt on going into solution partially dissociates into positive and negative ions with the weakening of the electrical binding forces as a result of the high dielectric constant of the solvent. On application of an electric field these ions drift towards the electrodes of opposite sign and become neutralised on reaching them. These facts are demonstrated by Faraday's laws of electrolysis.

A gas under normal conditions is a poor conductor of electricity, but its conductivity may be increased if it is irradiated by X-rays or by ultra-violet, as the neutral atoms or molecules become ionised. By far the most important process for producing ions in a gas is cumulative ionisation, or ionisation by collision, which results from any residual ions in the gas gaining from an applied electric field sufficient energy to disrupt neutral molecules or atoms. These newly-formed ions will move towards the electrodes and in so doing will give rise to further ionisation on collision with the gas molecules. Thermal ionisation is due to the atoms and molecules moving faster with increase of temperature and consequently increasing the violence of their

impact. Photionisation is due to the incidence of photons on other atoms capable of partially or totally absorbing them.

In a given gas the negative ions have a greater mobility than the positive ions. Ions, like dust particles, can precipitate condensation clouds from air supersaturated with vapours.

Ionium. Radio-active element (symbol Io) identical in chemical properties with thorium (*q.v.*).

Ionone (Gr. *ion*, violet). Chemical substance with the characteristic smell of violets, used as the basis of artificial violet perfumes. It is isomeric with irone, the odorous principle of orris-root. Discovered in 1893 and prepared from citral, it has its chief source in lemon-grass oil. The well-known Parma violet perfume is compounded of ionone.

Ionosphere. A region in the earth's atmosphere, surrounding the globe and extending from about 40 miles to something between 200 and 400 miles above the surface of the earth. Here a significant proportion of air molecules has become ionised (*i.e.* electrons have been split off leaving positively charged ions) by ultra-violet rays and other radiations from the sun. The free electrons render the region conducting, and electric currents flowing through it are believed to account for minute day-to-day variations in the earth's magnetic field. It also reflects wireless rays, from which point of view it is divided into two layers: the Heaviside layer (or E-region) from 40 to about 80 miles up, which reflects long and medium waves; and the Appleton layer (or F-region) from about 125 miles upwards, which reflects short waves. Ultra short waves (below 10 metres) are not usually reflected by the ionosphere.

Iota. Pen-name of Kathleen Mannington Caffyn, *née* Hunt (1856-1926), British novelist. Her reputation rested chiefly upon *A Yellow Aster*, 1894, which on its first appearance created great interest on account of its unconventional attitude to marriage.

I.O.U. Form of written acknowledgement of a debt. The letters are an abbreviation of the phrase *I owe you*. The usual form is "To A. B., I.O.U. £5. C. D., July 19, 1948." Such an acknowledgement of debt does not require a stamp, since it is not a promise or agreement to pay, nor is it a receipt for money. An I.O.U. is not negotiable, but it is evidence

of debt, and as such can be sued upon. If it does not contain the name of the person to whom the debt is owed, then the presumption is that the holder of the I.O.U. is the person to whom the money is payable. See *Promissory Note*.

Iowa. River in the state of the same name in the U.S.A. Rising near the boundary with Minnesota, it flows 329 m. S.E. to join the Mississippi, uniting with the Cedar for the last 28 m. from Columbus Junction. A sluggish stream, moving through bluffs and hills, it is not an artery of trade, and by Act of Congress in 1870 was declared unnavigable above Wapello.

Iowa. North-central state of the U.S.A. The Mississippi forms its entire E. border, while the Missouri flows along three-quarters of the W. border. The state of Missouri lies S. and Minnesota N. Bluffs along the chief rivers are the only relief to its undulating land surface. Area, 56,290 sq. m. This is the leading agricultural state of the Union. It has 97 p.c. of its land under cultivation, including 25 p.c. of the nation's Grade A agricultural land; supports 36 p.c. of its pop. on farms; and provides more than a tenth of all food produced in the U.S.A., ranking first for maize, oats, hogs, poultry, market cattle, and horses. Other crops are buckwheat, barley, flax seed, soya beans, sweet potatoes, potatoes, hay, apples, pears, and grapes. Iowa is the world's greatest producer of popcorn and timothy seed.

There are no big industrial centres, the varied manufactures being dispersed throughout the state, which has the world's largest cereal, washing machine, and fountain pen factories. It makes agricultural implements, rly. equipment, motor car bodies, furnaces, gas and electrical equipment, bronze, aluminium, and copper goods, clothing, pearl buttons, and cosmetics. Mineral resources include 3,000,000 tons of coal a year, gypsum, limestone, clay, sand, and gravel.

Besides natural water transport, there are 8,884 m. of rly. and 83 airports. No farm or town is more than 10 m. from a rly. station. Education is provided by 25 universities and colleges, and Iowa has the nation's highest literacy rate, 99.2 p.c. Two senators and eight representatives go to congress. Des Moines is the capital. Iowa became a territory in 1838 and a state on Dec. 28, 1946. Pop. (1950) 2,621,073. *Pron.* with accent on first syllable.

Iowa City. Co. seat of Johnson co., Iowa, U.S.A. The city stands on the Iowa, 55 m. W.N.W. of Davenport, and is served by rlys. and an airport on the trans-continental air mail route. The surrounding country is agricultural. Here are the state university, with its medical centre, and more than 50 buildings, dominated by the Old Capitol, now a centre of administration. Founded in 1839, Iowa City was incorporated in 1853 and was the territorial and later the state capital until superseded by Des Moines in 1857. Iron ore was an important product before the Civil War, but it became exhausted, and the superior deposits of Michigan and the rise of Pittsburgh led to the furnaces being closed. Products today are coke, steel, stoves and ranges, Portland cement, bricks and tiles, and chemicals. Textile machinery is made and maize is processed. Pop (1950) 27,212.

Ipecacuanha (*Uragoga ipecacuanha*). A Brazilian plant, the dried roots of which are used in



Ipecacuanha. Foliage and flower of this Brazilian medicinal herb.

medicine. The most important constituent is an alkaloid called emetine (*q.v.*). Ipecacuanha forms a useful emetic, particularly for children suffering from bronchitis or laryngitis associated with difficulty in breathing. The drug has a stimulating effect upon the mucous membrane of the lungs, producing coughing, which renders it of value in treating bronchitis accompanied by difficulty in expectoration. Ipecacuanha or emetine may be used in cases of amoebic dysentery. The chief preparations are the liquid extract; the tincture; and the compound pill with squill. This herb is also a constituent of Dover's powder.

Ipheicles or **IPHICLES**. In Greek mythology, son of Amphitryon and Alomēnē, and half-brother of Hercules. He became the faithful companion of the hero.

Iphicrates (d. 353 B.C.). Athenian general. The son of a shoemaker, he rose rapidly in the Athenian army, and at the age of 25 was in command of a force sent to help the Boeotians. His victories over the Spartans and others were chiefly due to his formation of a new class of fighter (*peltastai*), midway between heavy and light armed troops. During the Social war he was prosecuted for cowardice, having declined a naval engagement with the enemy in a storm, but was acquitted. *Pron.* eye-fik-rat-eez.

Iphigenia (Gr. Iphigeneia). In Greek legend, the daughter of Agamemnon and Clytaemnestra. When the Greek fleet destined for Troy was detained at Aulis by a calm sent by Artemis, who had been offended because Agamemnon had killed a stag sacred to her, Calchas the soothsayer declared that Agamemnon must sacrifice his daughter to appease the wrath of the goddess.

Iphigenia was sent for, under the pretext that she was to be married to Achilles; but at the moment when the sacrifice was about to take place, Artemis bore her off in a cloud to the country of the Tauri, where she became a priestess. There subsequently came her brother Orestes, and his



Iphigenia waiting to be made as sacrifice at Aulis

From a mural painting in Pompeii

friend Pylades, who as strangers narrowly escaped being sacrificed; but Iphigenia recognized her brother in time to save them. The story of Iphigenia is the subject of two plays by Euripides, one by Racine, and one by Goethe; and of two operas by Gluck, *Iphigénie en*

Aulide (the *ligretto* based on Racine) and *Iphigénie en Tauride*. *Pron.* if-ij-en-eye-a.

Ipoh. Town of Malaya, capital and largest town of Perak. Situated in the rich tin producing valley of Kinta, it was the centre of the Malayan tin mining industry both before and after the Second Great War. It was occupied by Japanese forces, Dec. 29, 1941, after the British withdrawal, and liberated by the surrender of the local Japanese in Sept., 1945. It



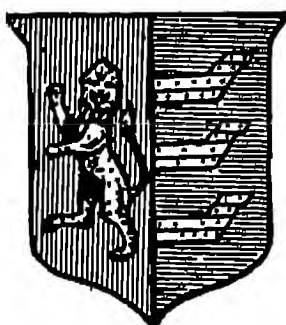
has rly. connexion with Penang and Singapore. Pop. (est. 1955) 106,000.

Ipoly (Ger. Eipel; Cz. Ipel). Magyar form of the name of a tributary of the Danube. It rises in the region of Banská Bystrica, Czecho-Slovakia,

in the Ore Mts., and flows at first S., then S.W., then again S. to join the Danube at Szob, E. of Esztergom, in Hungary. It is 120 m. long, and for three-quarters of its length forms the boundary between Czecho-Slovakia and Hungary.

Ipomoea. A genus of plants belonging to the Convolvulaceae. Several species found in Mexico provide jalap, a purgative drug. Another species is the morning glory of the garden. See Jalap; Morning Glory.

Ipswich. The county town of Suffolk. Also a county borough and an ancient seaport, it stands where the Gipping becomes the Orwell, 69 m. N.E. of London, and is a railway junction. Of its old

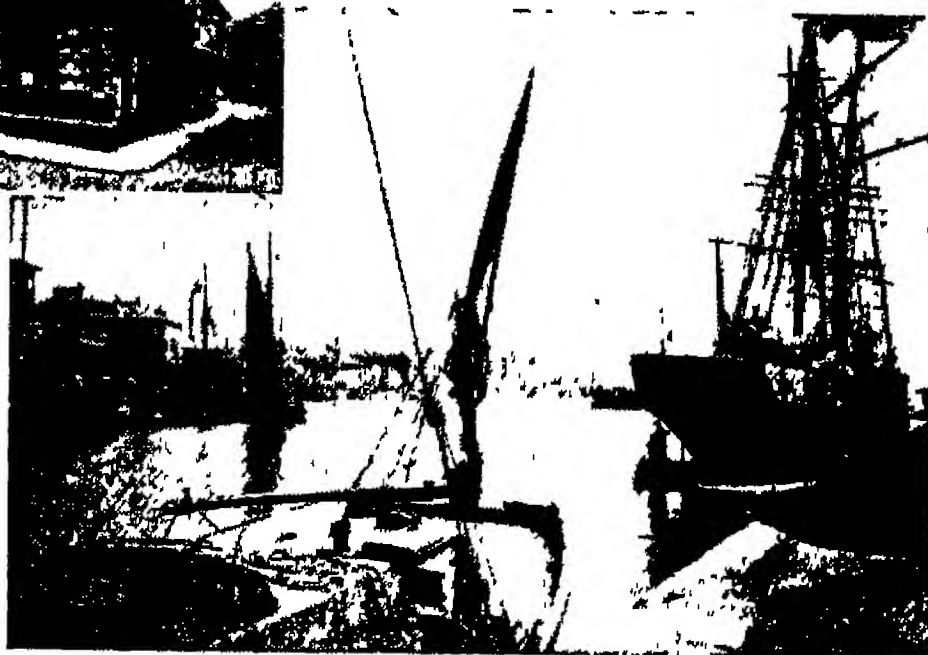


Ipswich arms

churches the chief are S. Margaret's, S. Lawrence's, S. Matthew's, and S. Peter's with its Norman font. Modern churches include S. Michael's, All Saints', S. Thomas's, All

Hallows', and the Roman Catholic S. Pancras's. S. Mary-at-Tower has been rebuilt, but has interesting antiquities. There is a fine, modern town hall; near it, on Cornhill, is the corn exchange. There are museums, an art gallery, public libraries, and hospitals.

Ipswich school, founded in the 15th century, is in a modern building; there are technical, art, and other schools. Wolsey's Gateway, built by the cardinal (who was the son of a grazier and butcher of Ipswich), is a reminder of the great college he planned and began here. The borough also has several old houses and streets, including Sparrowe's House, 1567, and Pykenham Gateway; and there are Christchurch and other



Ipswich, Suffolk. The docks on the Orwell. Upper picture, Sparrowe's House, built 1567, in the Buttermarket

public parks. The Great White Horse Hotel figures in Charles Dickens's *Pickwick Papers* as the scene of Mr. Pickwick's misadventures in a lady's bedroom.

Ipswich is a centre for various kinds of engineering work. Other industries are tobacco manufacture and the making of clothing and boots and shoes. There is a port with docks of 26½ acres, and vessels up to 460 ft. long and 25 ft. 6 in. draft can be berthed at Cliff Quay. The town is governed by a mayor and corporation, which provides water and owns the markets. Ipswich is a borough constituency. St. Edmundsbury and Ipswich is the name of a bishopric of the Church of England.

The original name of Ipswich was Gipeswic. It was a town at the time of Domesday, and its burgesses received many privileges from the kings. It sent two members to parliament in 1295 and retained the right until 1918. A prosperous port in the Middle Ages and later, it was in the 15th century a centre of the wool trade. A cemetery of the period 450-600

was discovered here in 1906, and from it were taken necklaces, drinking cups, etc., now in the museum. During both Great Wars it was raided by German aircraft. Pop. (1951) 104,785.

Ipswich. City of Queensland, Australia. Standing on the Bremer river, 24 m. by rly. S.W. of Brisbane, it has rly. works and coalmines in the vicinity, manufactures woollen goods, and has a trade in agricultural produce. Pop. (1954) 38,966.

Iqbal, SIR MUHAMMAD (1876-1938). An Islamic poet. Born at Lahore, he was educated there and at Cambridge university, and was appointed professor of philosophy at Government College, Lahore. A passionate love of all things Islamic permeated his life and work, and he took a prominent part in the political life of the Punjab. He was knighted in 1923 for services to Indian literature. Outstanding among his collections of essays and poetry were *Secrets of the Self*, 1915; *The Mysteries of Selflessness*, 1916; *the Message of the East*, 1923; *The Call to March* (Urdu poems), 1925; *Songs of a Modern David* (in Persian), 1930.

Iquique. A seaport of Chile, capital of the dept. of Tarapacá. On the coast, 40 m. by rly. W.S.W. of Tarapacá, and 150 m. S. of Arica, it is the chief nitrate port of Chile, and is almost surrounded by an arid desert. Its water supply comes by an aqueduct from the Cordillera at Pica. There are rly. shops, soap and boot factories, and a water distilling plant. The anchorage is sheltered, but vessels have to load from launches owing to heavy surf. The city is the outlet for the famous mines of the interior, linked with it by rly.

The silver mines of Huantajaya lie to the N. of the city. The chief exports besides nitrates are iodine, copper ore, and borax. In 1868 and 1877 the city suffered much from earthquakes. A naval action was fought off the coast in 1879, and the city, formerly belonging to Peru, was transferred to Chile in 1883. During the revolution of 1891 it was captured and held for a time by rebels. Pop. (1952) 39,576. *Pron.* ee-kee-kay.

Iquitos. Tribe of American Indians. They are found in Ecuador, about the headwaters of the Amazon, although now few in number. They are specially known for their skill in making the drink called chicha. *Pron.* ee-kee-tose.

Iquitos. Town and river port of Peru, capital of the dept. of Loreto. It stands on the Marañon

or Upper Amazon, 348 ft. above the level of the sea, 58 m. above the mouth of the Napo and 210 m. W. of Loreto. Founded in 1863 to open up trade with the Atlantic coast by means of the river, it carries on an extensive trade in rubber and Panama hats, and possesses a shipyard, floating dock, government ironworks, machine shops, and lumber mills. Ocean-going steamers ply up the river as far as the town, 2,500 miles from the open ocean. A highway connects it with Lima. Pop. 42,000.

Irala, DOMINGO MARTINEZ DE (1486-1557). A Spanish explorer. Born in the prov. of Guipuzcoa, he went to S. America with the early adventurers, helped to discover the countries watered by the river Plate, and was in 1538 chosen captain-general of this region. He died in Paraguay.

Iran. Persian name for Persia. Generally it is the old name of the great plateau of Central Asia and the tribes inhabiting it. Iran was the land lying between the Caucasus, the Hindu Kush, the Indus, the Persian Gulf, Kurdistan, and the Tigris, thus including Afghanistan and Baluchistan. Historically, ethnographically, and linguistically, Iran is of the great-

est interest as a cradle of the human race.

Iranian. Branch of the Aryan sub-family of Indo-European languages, the other branch being the Sanskrit. The word, ultimately identical with Aryan, designates also the tableland (Iran) between the Tigris and Indus.

The only known ancient Iranian languages are that of the Avesta, and the Old Persian of the cuneiform inscriptions. These developed into the Middle Persian or "Pahlavi" dialects, known from about the 3rd to the 9th century A.D., and they in turn into modern literary Persian and the allied vernaculars. The term Iranian religion is sometimes applied to Zoroastrianism. The Iranian Plateau people are a variety of the Mediterranean stock characterised by a long face and aquiline nose.

Irapuato. Town of Mexico, in the state of Guanajuato. It is 32 m. S. by W. of Guanajuato and is served by the national rlys. of Mexico. It contains a number of old convents, and is called the Strawberry City on account of the great quantity and the fine quality of the fruit grown in the district, which is the chief article of trade. Drawn thread work is a notable craft. Pop. 21,500.

IRAQ: ARAB STATE OF ASIA

Here is the description and history of the state of Iraq, formed in 1919 from the ancient Mesopotamia (q.v.). See also the articles on Euphrates and Tigris; Bagdad, Basra, Mosul, and other towns; Arab League; Berlin-Bagdad Railway; Mesopotamia, Conquest of; also Feisal I, Feisal II, Rashid Ali el Galaini, etc.

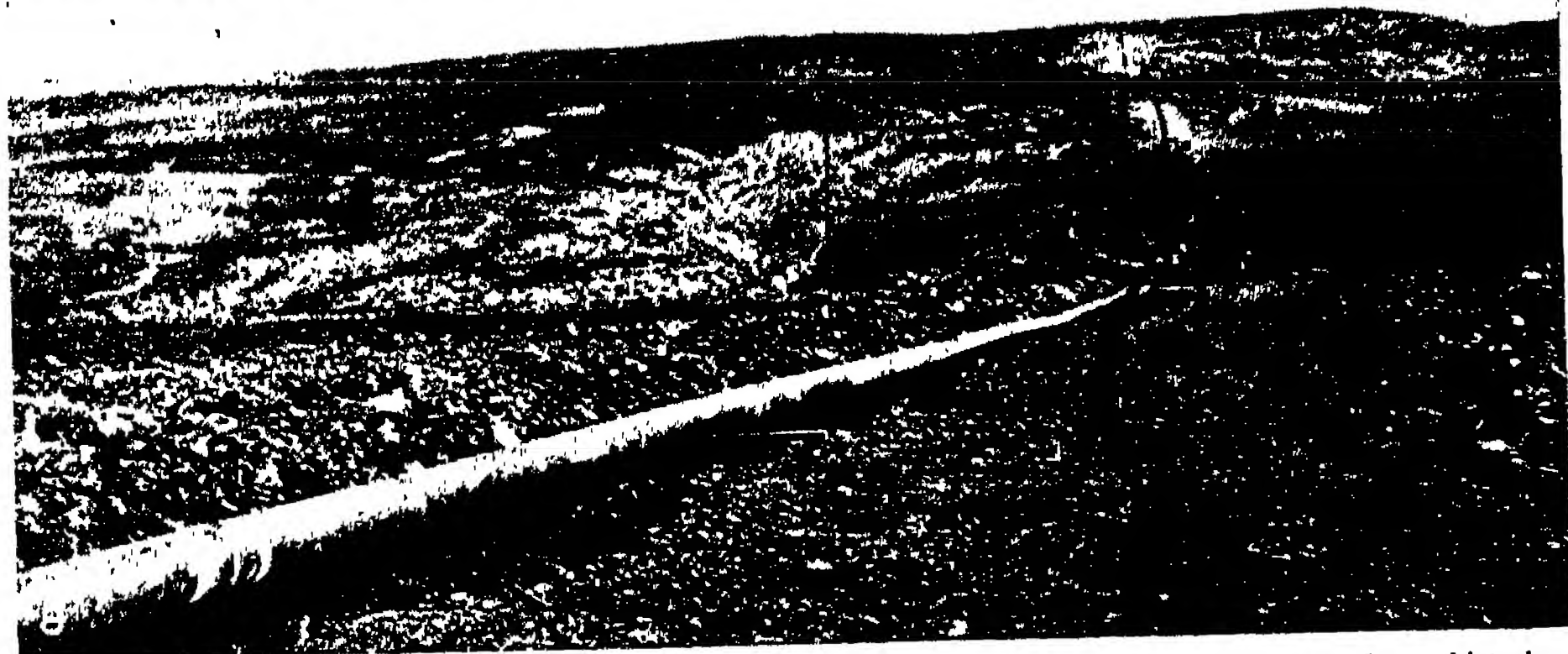
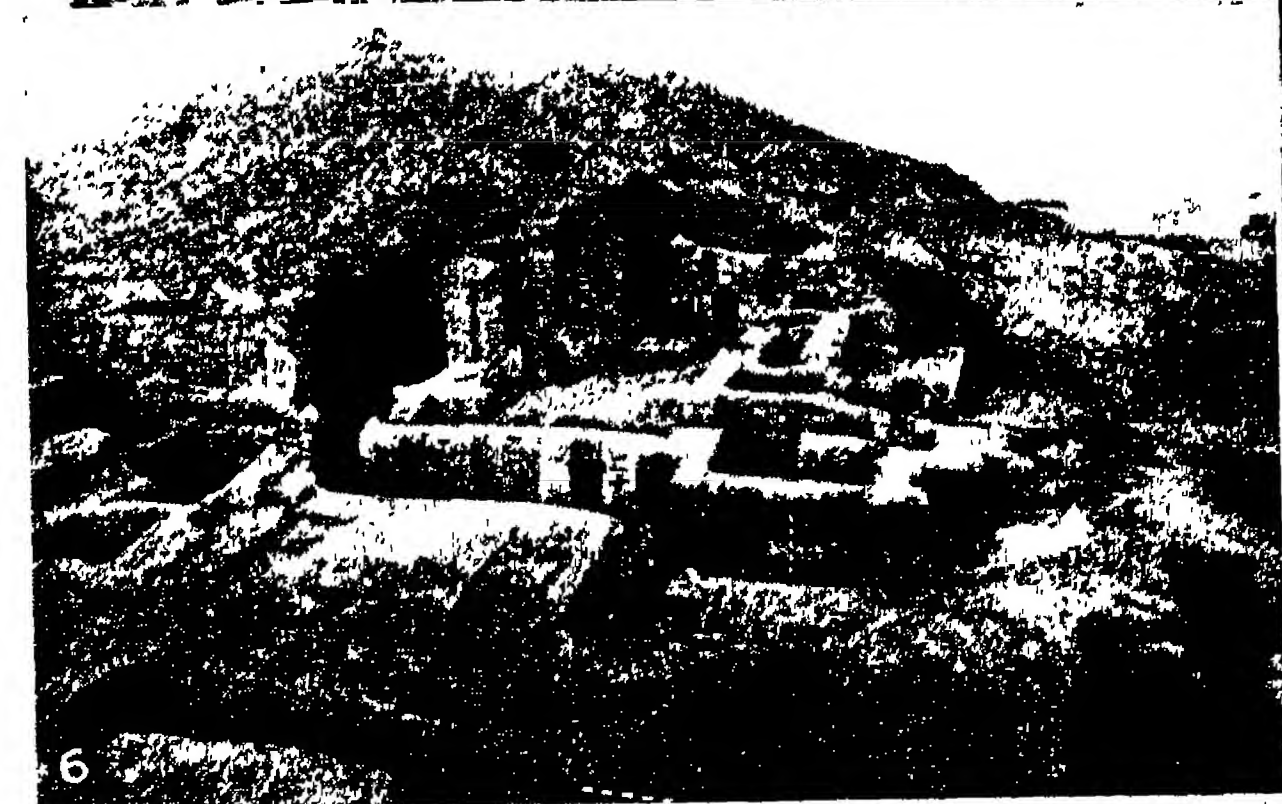
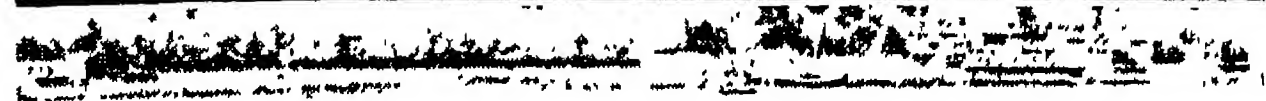
Iraq is an independent state of Asia, the ancient Mesopotamia. It consists of the three former vilayets of the Ottoman empire, Bagdad, Basra, and Mosul. Its area is 168,070 sq. m. and its population 4,799,500.

It is bounded by the Persian Hills on the E., the mountains which run through Asia Minor eastwards on the N., the Syrian mountains on the W., and the northern deserts of Arabia on the S. It may be divided into three E.-W. belts: (1) the northern, or mountainous, from the headwaters of the Euphrates and Tigris to the foothills about Birojik and Jezirah; (2) the central, or undulating, from (1) to the latitude of Tuz Khurmatli, virtually the N. limit of the date palm, with a rainfall sufficient for crops; (3) the southern, or alluvial proper, S. of (2), chiefly saline lands (often containing 15 p.c. lime), usually desert, but very fertile near water. This is the date-growing district. The largest towns are Bagdad,

the capital, Mosul, Basra, and Diwaniya. Basra, on the tidal river, the Shatt-el-Arab, is the only port. The bar at the mouth is a hindrance to deep-sea-going vessels. The great majority of the people profess Islam.

The climate is good for eight months of the year. The summer is very hot, the temp. reaching 124° F. at Bagdad, and 115° F. at Mosul. May to Sept. are the worst months. The heat is never unendurable in the towns, but Basra is trying to Europeans. The season for rain begins in Nov. and ceases about April; snow has occurred as far S. as Babylon. The average rainfall is about 8 ins. a year. The country, particularly in the N., is healthy.

The geology of the N. belt shows sedimentaries (limestone, etc.) with small granitic tracts in the N.W. and two large volcanic tracts between the two rivers extending intermittently from the N. of Diarbekir (in Turkey) as far S. as Mosul. In the central



1. Young Arab woman of Bagdad. 2. Elderly Kurd from the Mosul region. 3. Octogenarian Jew. 4. Arab herdsman from the west bank of the Tigris. 5. Melons being ferried across the Tigris in goofahs. 6. Excava-

tions at Eridu (*q.v.*), which have disclosed a prehistoric temple beneath the later ziggurat. 7. Arab beehive village. 8. Oil pipe-line, seen (during construction), running from Kirkuk to Palestine and Syria.

IRAQ: CONTRASTS OF OLD AND NEW IN THE MESOPOTAMIA OF THE BIBLE

Photos, 1-5, 7, U.N.A.; 6, Directorate of Antiquities, Bagdad; 8, Topical

belt the limestones and chalky deposits of the foothills give place to red-brown lands, marls, gypsums, etc., on the flatter parts, relieved by a marble outcrop near Mosul, and the super-cretaceous red sandstone range of the Jebel Hamrin N. of Bagdad. In the S. belt the delta is alluvial clay with rare outcrops of limestone. At the volcanic cone Jebel Senam there are quarries. Granite lies along the Persian frontier in a long belt, behind the nearer limestone slopes. A poor coal is found near Kifri; petroleum and naphtha in the Kirkuk district and at Qaiyara. N. of Kala Shergat; bitumen at Hit. The Kirkuk oilfield is connected with the Mediterranean coast at Banias in Syria, Tripoli in Lebanon, and Haifa in Israel.

On the Euphrates and Tigris and their affluents depends the immense fertility of the land, which, according to Herodotus, returned seed two hundredfold. The cultivable area in the delta is 10,000,000 to 12,000,000 acres.

The winter crops are wheat, barley and beans; the summer crops maize, millet, rice, sesame,

melons, and cotton. Tobacco is grown, and about 80 p.c. of the world output of dates. Grapes, pomegranates, oranges, lemons, figs, apricots, mulberries, and walnuts are the chief fruits; vegetables are plentiful, except the potato, for which the egg-plant is a substitute. Lucerne grows in the date plantations, and liquorice grows wild near water, and is exported to America. Wool is another important export. Building timber in the central and southern districts is scarce. In S. Iraq the reed thickets provide the material for the construction of Arab huts.

Wild and Domestic Animals

Domestic animals are the horse (used for war in Assyria), ass, ox, buffalo, humped ox in the S., sheep, goat, and dog, including the saluki, a hunting dog, and in the flat districts, the camel. Wild animals are a kind of panther, jackal, hyaena, fox, gazelle, pig, and, in the hills, ibex; smaller are the desert hare, jerboa, and, in the S., mongoose, and there are tortoises and crabs in the rivers. Anciently there were elephant,

lion, and onager. Birds include the eagle, vulture, buzzard, kite, raven, hawk, owl, many kinds of water-fowl, stork, ibis, kingfisher, etc., and sea-fowl.

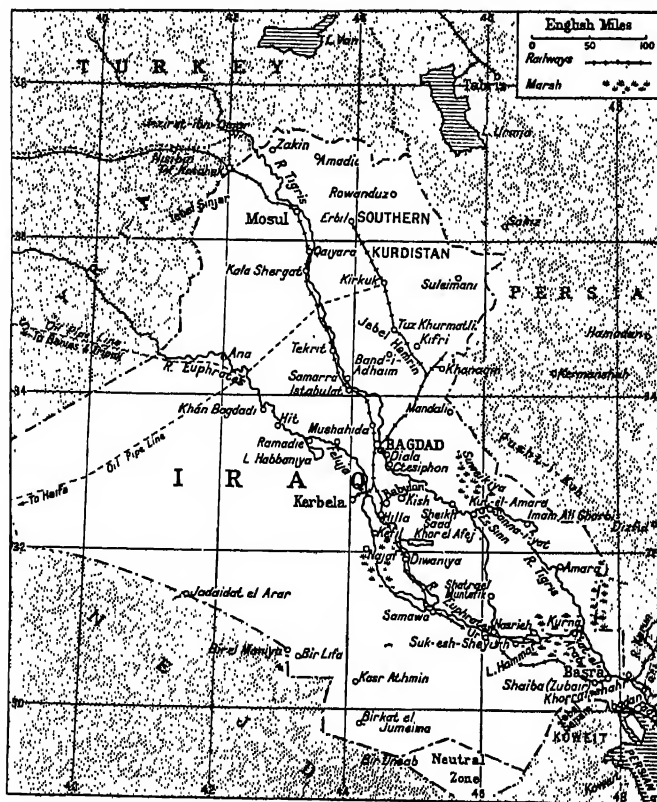
Arabs form 94 p.c. of the pop., with various minorities, Kurds, Jews, Turks, in that order. More than 4,500,000 profess Islam. There are some 150,000 Christians, 120,000 Jews, and small groups of other religious beliefs (Yazidis, Bahais, etc.). Christians, chiefly of Armenian and old Nestorian stock, live about Mosul and in Bagdad. The Arabs, broadly speaking, consist of (1) fellahin, settled peasants; (2) nomads who move from one grazing ground to another. The three largest tribes are the Shammar, the Anazeh, and the Muntafik. The Chaldean community numbers only about 70,000, but among its members are men of letters, doctors, and lawyers, and it possesses schools, societies, and many convents. The 25,000 Syrian Catholics possess a splendid monastery which dates from the 4th century A.D. The Orthodox Syrian community, about 12,000 in number, is descended from the great Semitic family that adopted the Christian faith at the dawn of Christianity and had a flourishing civilization that endured for many centuries. Their head is the 120th patriarch of Antioch and the East.

Education and Health

Primary education, from 6 to 12, is free and, in theory, compulsory; secondary education, from 13 to 20, is also free. Arabic is the medium of instruction except in the Kurdish speaking areas, where Kurdish is used. In 1954-55, 224,253 boys and 70,744 girls were attending 1,579 government elementary schools, 32,036 boys and 9,448 girls were attending 159 government secondary schools. Iraq has no university, though there are colleges for medicine, pharmacy, training of teachers, law (all co-educational), engineering and military training (both for boys).

Malaria, directly or indirectly, accounts for some 50,000 deaths a year; it is due chiefly to the imperfect system of agricultural irrigation which makes control of the malaria-transmitting mosquito very difficult. Hookworm affects probably a third of the people, for the poor go barefoot.

Wheel-turned pottery, plain or with a blue glaze, copper vessels, baskets, cloth, dyeing materials, tent-cloths from hair, especially gypsum mortar, Arab summer cloaks, woollen rugs and coarse



Iraq. Map of this Arab-populated state through which flow the Tigris and Euphrates, showing the railways and oil pipe-lines

carpets, clothing, matches, cigarettes, cement, tiles, and alcoholic spirits are made.

There are about 1,000 m. of state-owned rlys. The chief line runs from Basra to Kirkuk, 555 m., passing the ancient cities of Ur, Babylon, and Kish. At Bagdad, a road and railway bridge, which was completed in 1949, carries the railway across the river Tigris. Branch lines run from Jouloula to Khanaqin, and from Bagdad through Mosul to Tel Kotchek. The last part of the long-planned Berlin-Bagdad rly., connecting Bagdad with the Bosphorus, was completed after the outbreak of the Second Great War, and inaugurated July 17, 1940. There are 4,550 m. of roads for vehicular traffic; and international airports at Bagdad and Basra.

Iraq is a limited monarchy. The king is advised by a cabinet, responsible to a parliament (*majlis*) of two houses.

HISTORY. Conquered from the Turks during the First Great War, Iraq was in 1919 declared a mandatory state, and the mandate for it was given to Great Britain. In 1921 Feisal (1883-1933), a son of the king of the Hejaz, was elected king by the votes of the people, and in 1922 relations between Iraq and Great Britain were defined by a treaty, under which Great Britain was to recommend Iraq for membership of the League of Nations at the earliest possible moment. This she did in 1932, when the League terminated the mandate, Great Britain and Iraq having entered in 1930 into a treaty of alliance.

Death of King Feisal

Up to the end of the mandate the leaders of Iraq, guided by British advisers, initiated changes that promised progress. Feisal showed himself capable both of controlling the city politicians and of acting as a link between the tribes and the town populations. His sudden death, attributable in the main to overwork, was a disaster for the country. His son, King Ghazi, lacked qualities of leadership, and the result was a struggle for political power between various personalities who made use of local conditions. Under the Organic Law of 1924, on which the constitution is based, the king had no right to dismiss a cabinet (an amendment of 1944 gave him this power). Attempts were made to change the government by tribal uprisings, but the premier Yasin al-Hashimi used the armed forces of the state to

put these down. A series of *coups d'état* engineered with the help of the army followed, both before and after the accession of four-year-old Feisal II, in 1939. The most serious was that of 1941, when a former prime minister, Rashid Ali el Galaini, a man with pro-Axis sympathies, deposed the regent, Ameer Abdul Illah, uncle of the king, on April 11. On the 18th, British troops arrived by sea at Basra, to Rashid's surprise. They were given permission to land, on condition that no more should be landed until those already ashore had crossed the frontier out of Iraq.

Attack on R.A.F. Camp

A few days later Iraqi troops began to concentrate round the R.A.F. camp at Habbaniyah, near Bagdad (maintained like the R.A.F. camp at Shaibah, near Basra, under the 1930 treaty). They shelled it May 2-5, while their air force bombed and machine-gunned it. German aircraft appeared in their support, May 12, Italian on May 29. But British troops were advancing on Bagdad, Rashid fled, and the Iraqis asked for an armistice signed May 31. British troops occupied Mosul on June 3. The Regent returned to Bagdad, and Iraqi affairs became more placid. Iraq declared war on Germany, Italy, and Japan, Jan., 1943, but did not take an active part in the struggle. Iraqi sympathies were with the Arabs over the Palestine question, and the premier, Nuri Pasha, toured the Arab states in 1944 and helped to form the Arab League.

British forces were withdrawn in 1947, except from the R.A.F. bases at Habbaniyah, Shaibah, and Basra. These were ceremonially handed over to the Iraqi govt. in 1956, under the terms of a new British-Iraqi agreement.

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Irawadi OR IRRAWADDY (anc. Erivati—the great river). River of S.E. Asia. It rises in two head-streams on the S. slopes of the Nam-Kiu mts. bordering China. The branches unite about 30 m. N. of Myitkyina, and the river, henceforth known as the Irawadi, traverses Burma from N. to S. and discharges into the Bay of Bengal

by a delta of several mouths, W. of Rangoon. The delta has an area of 20,000 sq. m., and between the Bassein and Rangoon channels is a network of waterways with jungle swamps and teak forests, and paddy fields in the clearings. N. of Prome, almost to Mandalay, the lower valley is without rly. communication. Above Mandalay three rlys. use the valleys of tributaries rather than that of the main stream. The longest tributary is the Chindwin, which flows through the almost inaccessible and mountainous parts of N.W. Burma. N. and E. of the Irawadi the country is hilly and thickly covered with forest as far as the borders of Assam and Bengal on the W. and the frontiers of China and Siam on the N. and E.

The river attracts the population and commerce of Central and Upper Burma, leaving a fringe of semi-civilized tribes on each side. About 1,250 m. in length, it is of great importance for irrigation and as a trade channel. It is navigable for some 900 m. for passenger and goods steamers, and Bhamo can be reached by smaller craft. Above this town the river is obstructed by rapids. Mandalay is the chief town on the river, but Rangoon stands on the Rangoon branch of the delta.

Japanese Invasion

Japanese forces which invaded Burma from Siam reached the Irawadi early in March, 1942, British troops evacuating Rangoon March 7 and withdrawing N. The Japanese entered Mandalay on May 1. The Allied Ledo road forces cleared the upper reaches of the river during 1944. Farther S. the 19th Indian div. (British 14th army) crossed it at Singu on the night of Jan. 14-15, 1945; and when, at the beginning of March, the Japanese concentrated their forces to protect Mandalay against a threatened attack from the W., advanced rapidly S. down the E. bank of the Irawadi, securing full control of Mandalay by March 20. Rangoon was occupied by sea and airborne troops on May 3, and the whole course of the river was freed when forces advancing from N. and from S. met at Tharawaddy on May 16.

Irbit. Town of Sverdlovsk region, R.S.F.S.R. It is 100 m. N.E. of Sverdlovsk on a branch rly. and has flour mills, tanneries, and metallurgical works. The great fur fair held here in Feb.-March from 1643, was reopened after the civil war, in 1922. Pop. (est.) 20,000.

IRELAND: THE ISLAND AND ITS HISTORY

HUGH SHEARMAN, B.A., Ph.D., and E. G. QUIN, M.A.

This article is concerned with the whole of Ireland as a physiographical entity, also with the history of its people and its government from earliest times down to 1922, the year of its partition into two states. For later history, together with details of political administration, education, industry, trade, etc., see the separate articles on Irish Republic and Northern Ireland

Ireland, the second largest island of the British Isles, is separated from Great Britain by the North Channel, the Irish Sea, and St. George's Channel. Its area is 32,586 sq. m. It is surrounded by shallow seas and is well within the continental shelf. The centre of the island, between Galway Bay and Dublin Bay, is a low and very slightly rolling plain, drained by the Shannon, Liffey, and Boyne. The rock under this plain is carboniferous limestone. Peat bogs have readily formed over it, the bog of Allen lying between Shannon and Liffey. Some of the lakes, such as Lough Derg, are produced by river expansion in shallow troughs. Others, like the lakes of the r. Erne, have been caused by the solution of the limestone in the river water.

Highlands of the North

N. of the central plain older rocks trend from S.W. to N.E., as in Scotland. The Antrim Plateau, the Sperrin Mts., the mts. of Donegal and of Mayo and Connemara are of igneous rocks or crystalline schists, similar to those of the Scottish Highlands. The collapse of one corner of the Antrim basalt caused the depression occupied by Lough Neagh. The lower hills from Longford to the N.E. belong to the Silurian system, continued in the S. uplands of Scotland. The Mourne Mts., of intrusive granite, lie within this system.

The lower ground of the upper Shannon and the Erne is a continuation of the limestone plain, with outcrops of millstone grit in the Erne watershed. The limestone extends to the S. in the upper valleys of the Barrow, Suir, and Blackwater. The S.E. or Wicklow highlands form the highest part of a series of Cambrian and Silurian rocks which stretch N.E. from W. of Waterford Harbour. On both sides of the Shannon estuary and on the hills near Kilkenny on both sides of the Nore, millstone grit and the coal measures control the relief of the land; but workable coal is almost absent from Ireland. There have been small workings in Kilkenny and Tyrone and at one time in N. Antrim.

The highlands of the S., the Galtees and Knockmealdown Mts., and the mts. of Kerry, including

Macgillcuddy's Reeks, trend E. and W. in roughly parallel ridges and consist mainly of Devonian old red sandstone, forming, like the heights of Cornwall, Devon, and S. Wales, relics of an old system of folded mountains. Fiords such as Killary Harbour and Carlingford Lough, many lakes as in Connemara, the erratics of the Mourne and Wicklow Mts., the eskers or ridges of glacial gravel on the central plain, and the drumlins or little rolling hills of S. Ulster, are all relics of glacial action. Dingle, Bantry, and other bays of the S.W. coast are rias or drowned valleys, not fiords, and owe nothing to glaciers.

The principal islands are off the N. and W. coasts. Rathlin Island is in the N. Channel off Fair Head, co. Antrim; Tory Island and Aran Island off Donegal; Achill Island off Mayo; the Aran Islands lie in Galway Bay. The most northerly point in Ireland is Malin Head, co. Donegal, and the most southerly is Cape Clear, co. Cork.

Rainfall and Drainage

The average annual rainfall is 30-40 ins. in the E. and over the E. of the central plain; but in the W. and S.W. there are areas with annual rainfall as high as 80 ins. Though wetter than S.E. England, most of Ireland is considerably drier than Lancashire, Wales, or W. Scotland. The heavy rainfall of some areas and the trapping of water in others gives the island its noted greenness. The rivers have little fall and are generally slow and winding, though sometimes channelled by the rock formations. The Shannon system drains half the central plain; the Suir flows through the Golden Vale of Tipperary, but its valley, like that of the Barrow, Nore, and Slaney, in the S.E., is circumscribed by hills. The parallel valleys of the Blackwater, Lee, and Bandon, in line with the river estuaries of the S.W., are caused by the parallel ridges of the sandstone mts. The Boyne is the great river of the E. plain. The Bann, flowing N., drains Lough Neagh and a catchment area of 2,200 sq. m.

HISTORY. After the close of the last ice age the first people probably came to Ireland across the narrow sea between Scotland and

the N.E. coast of the island. The earliest traces of human life have been found on the N. shore of Lough Neagh, thought to belong to a period about 6000 B.C. Successive waves of Mesolithic and Neolithic invaders were followed by the Bronze Age people who found abundant copper on the island and rich deposits of gold in Wicklow. They have left some beautiful examples of their craftsmanship in metal. To the period from about 2500 B.C. belong the great stone monuments, the cairns and dolmens which still remain in many places. Later invaders came with weapons of iron, and it was probably they who brought a Celtic language.

Division into Five Kingdoms

At the beginning of the Christian era Ireland was divided into five kingdoms. The largest of these was Ulster in the north, extending as far as the Boyne and the Shannon. The earliest epics tell of King Conchobar and the warriors of the Red Branch and their wars with other kingdoms, particularly with Connacht. The swampy centre of the island made a barrier and a debatable territory in the wars of the small kingdoms, and it was only with difficulty that a High Kingship of the whole island emerged through the conquest of the kingdom of Meath by the rulers of Connacht and the establishment of a centre of rule at Tara in the 3rd century A.D. In the time of Niall of the Nine Hostages (379-405) the Irish made plundering raids on the British mainland and were among the forces causing the Roman provincial government of Britain to break down.

In one of these raids S. Patrick is believed to have been captured and brought for a while to Ireland. Later he returned as a missionary and seems to have experienced little difficulty in converting the natives to Christianity. The druidic religion which had formerly prevailed seems to have been superseded without serious conflict. Its former priestly functionaries continued to act as the custodians of a bardic literature and as interpreters of customary law. In the dark age of Europe, Ireland came to be a more or less peaceful shelter for learning and

a place from which fervent Christian missionaries went out to convert the new barbarian kingdoms. S. Columba established his headquarters on the island of Iona, from which Irish monks converted Scotland and N. England. From the great monastery of Bangor, co. Down, S. Columbanus went as a missionary to N. Italy and S. Gall was active in Switzerland. In Ireland itself the great monastic schools attracted both native and foreign scholars, and some beautiful specimens of intricate metal work and illuminated manuscripts have come down from those times, including the famous 9th-century Book of Kells.

From the later years of the 8th century Ireland began to be troubled by Scandinavian raiders, most of them Norse. Later they began to stay in Ireland all the year and make settlements. They penetrated easily up the southern rivers. Their settlements at Dublin, Wexford, Waterford, Cork, and Limerick ultimately became the first important towns, serving as trading centres and helping to bring Ireland into touch with the outer world. They were also to serve as bases for subsequent invaders. From about A.D. 1000 the invaders turned to Christianity. The native High Kingship was able to reassert itself fully only when Brian Boru defeated the Scandinavians at the battle of Clontarf in 1014. In the period of relative tranquillity which followed, social progress was made through the better organization of the church under S. Maelmaedog (Malachy), and the church in Ireland was drawn closer to the Continent in practice and doctrine; but a new invader was close at hand.

Anglo-Norman Adventurers

In 1167 the first company of Anglo-Norman adventurers came to Ireland at the invitation of an Irish chief who was getting the worse of a war with his neighbours. Most of the first invaders were from the Welsh Marches. Better equipped than the native Irish, they soon carved out lordships for themselves, using the Norse towns as ports and bases. Henry II, claiming that Ireland had been given to him by Pope Adrian IV, came in person to Ireland and received homage from Irish chiefs. This availed the Irish little, for the king made vast grants of land in complete disregard of Irish rights. Hugh de Lacy, earl of Meath, and John de Courcy, earl of Ulster,

carved out wide territories for themselves. King John established a royal administration in Dublin and gave English law to the colonists.

Under greater territorial magnates the colony flourished through the 12th century. Munster, Leinster, and Meath were thickly planted. Towns arose and trade flourished. An Irish parliament was established. But the Dublin government was weak, and power lay with the great lords. After the defeat of Edward II at Bannockburn, the native Irish saw a chance to right

their wrongs. They invited Edward Bruce, brother of the king of Scotland, to come to Ireland. He crossed to Larne with a strong army in 1315, proclaimed himself king of Ireland at Dundalk, and marched up and down the country ravaging and destroying until he was defeated and killed in 1318.

Although Bruce was defeated, his invasion started a decline of the colony. Many Anglo-Irish nobles became more Irish in their ways, adopting Irish names and language. The Statute of Kilkenny, 1366, aimed at keeping the two peoples distinct but could not be enforced. English colonists of more humble class faded away. As the Wars of the Roses set in, Anglo-Irish magnates took sides and played at politics in England, still further weakening English rule in Ireland. At the same time there was some revival of native Irish culture and scholarship, marked by the compiling of collections of epics and history. By the close of the 15th century, Ireland was divided into 40 or 50 lordships, some more Irish in character and customs, some more Anglo-Irish, each following its own law and engaging in wars with its neighbours. The sympathies of the most powerful magnates, the Fitzgeralds, were Yorkist. The Dublin government had no power beyond an area called the Pale, a few miles round Dublin. English



speech lingered in the southern towns, but these fended for themselves like independent communes. The most completely Irish area was Ulster, the land of the O'Neills and O'Donnells, isolated by the geographical difficulty of penetrating its interior.

Poynings' Law

Henry VIII made headway in taming or conciliating the Anglo-Irish lords. His deputy, Sir Edward Poynings, persuaded an Irish parliament in 1494 to agree that proposed laws for Ireland must first receive the sanction of the English privy council. Originally intended to protect the Irish parliament from subordination to the great lords, this later served to subordinate it to English government policy. Henry VIII, finding Ireland a source of danger when he wished to play a European role, intervened more in Ireland, ruling through English officials. He persuaded many Irish chiefs to surrender their land to him and receive it back from him, often accompanied by a peerage or other title of honour; but the land in Irish customary law was not really theirs to surrender, so that this settlement was fundamentally unstable. Henry's church policy, with its confiscations and suppression of monasteries, was applied to Ireland, but in isolated places monasteries

survived long into the following century.

Under Mary I the policy of confiscation and colonisation was adopted, and Leix and Offaly were planted with English. Under Elizabeth I the Protestant church reformation was imposed on Ireland. A long and piecemeal reconquest of Ireland took place, partly by private adventurers and partly by the government, stimulated by the menace of Spanish intervention. Great Anglo-Irish nobles, such as the earl of Desmond, were goaded into rebellion and ruined. The reign closed with a long war for the conquest of Ulster whose resistance was consolidated under Hugh O'Neill, earl of Tyrone, and Hugh Roe O'Donnell.

Under James I the conquered lands in Ulster were colonised with English and Scottish settlers and, many private individuals came from Scotland to settle in parts of Ulster not directly affected by the government plantation scheme. It proved the most stable and lasting of the colonisations in Ireland. Under Charles I the effort, made in the king's financial predicament, to make Ireland pay caused acute uneasiness, as the desire of Anglo-Irish Roman Catholic gentry to gain security of tenure in their lands and a clearly defined degree of toleration in their religion was exploited but never satisfied. At the same time, the earl of Strafford as deputy did much to foster trade. Just before the open struggle between king and parliament began in England a rising took place in Ireland. A Scottish army crossed over to protect the Ulster colony; but most of the island fell under the rule of the Irish and Anglo-Irish "Confederation of Kilkenny." Reconquest by Cromwell followed some years later, and a new land settlement removed all Roman Catholic landed proprietors to Connacht and introduced many new landowners. The Restoration in 1660 could not reverse this.

Battle of the Boyne

After William III supplanted James II, James landed in Ireland in 1689, becoming the hope of the dispossessed. Successfully resisted by the community in Ulster and defeated at the battle of the Boyne by William, he took refuge on the Continent, and once again the island was reconquered. The old ruling class had been virtually destroyed and the mass of the people remained, landless and unlettered, to serve as tenants of tiny

insecure holdings and as labourers on the estates of landowners who were aliens to them. Memories and fears of past Roman Catholic leadership caused the new Protestant proprietors to enact in the Irish parliament the "penal laws." These, passed over a long period of years, placed cultural and economic restraints upon the Roman Catholic population. They were excluded from education and from many of the things which marked the status of a gentleman, including even the possession of a good horse. They were excluded from acquiring land or from inheriting it otherwise than by equal division among heirs, which would quickly break up an estate into small holdings. They were excluded from parliament and from voting, from the armed services, the professions, and from many trades. The practice of their religion was not forbidden, but was severely hampered by a limitation on the number of their priests, a ban on their bishops, and the absence of education for their clergy.

Relaxation of Penal Laws

From the beginning these laws were softened administratively in their application. With the decisive defeat of the Jacobite cause in 1745 the fears that had prompted the penal laws receded and they were progressively repealed from the middle of the century onwards. The Presbyterians in Ulster were also subject to many disabilities, but not of as severe a character.

The relaxation of the penal laws was due to a decline in the anxiety of the Protestant ascendancy class. This same increase in confidence caused some of them to start a movement for reform of the government, removal of restrictions on Irish trade, and the freeing of the Irish parliament from English control under Poynings' Law and other enactments. The backing of the volunteers raised to defend Ireland during the War of American Independence enabled this opposition movement, under the leadership of Henry Grattan, to obtain the concessions it demanded by 1782. On the religious question there was deep disagreement. As restrictions on Roman Catholics were removed, they were able to compete economically with Protestants in various fields and so interdenominational feeling was increased rather than lessened.

The age of Grattan's parliament was one of growing prosperity and of considerable cultural and social activity, but it was also an age of

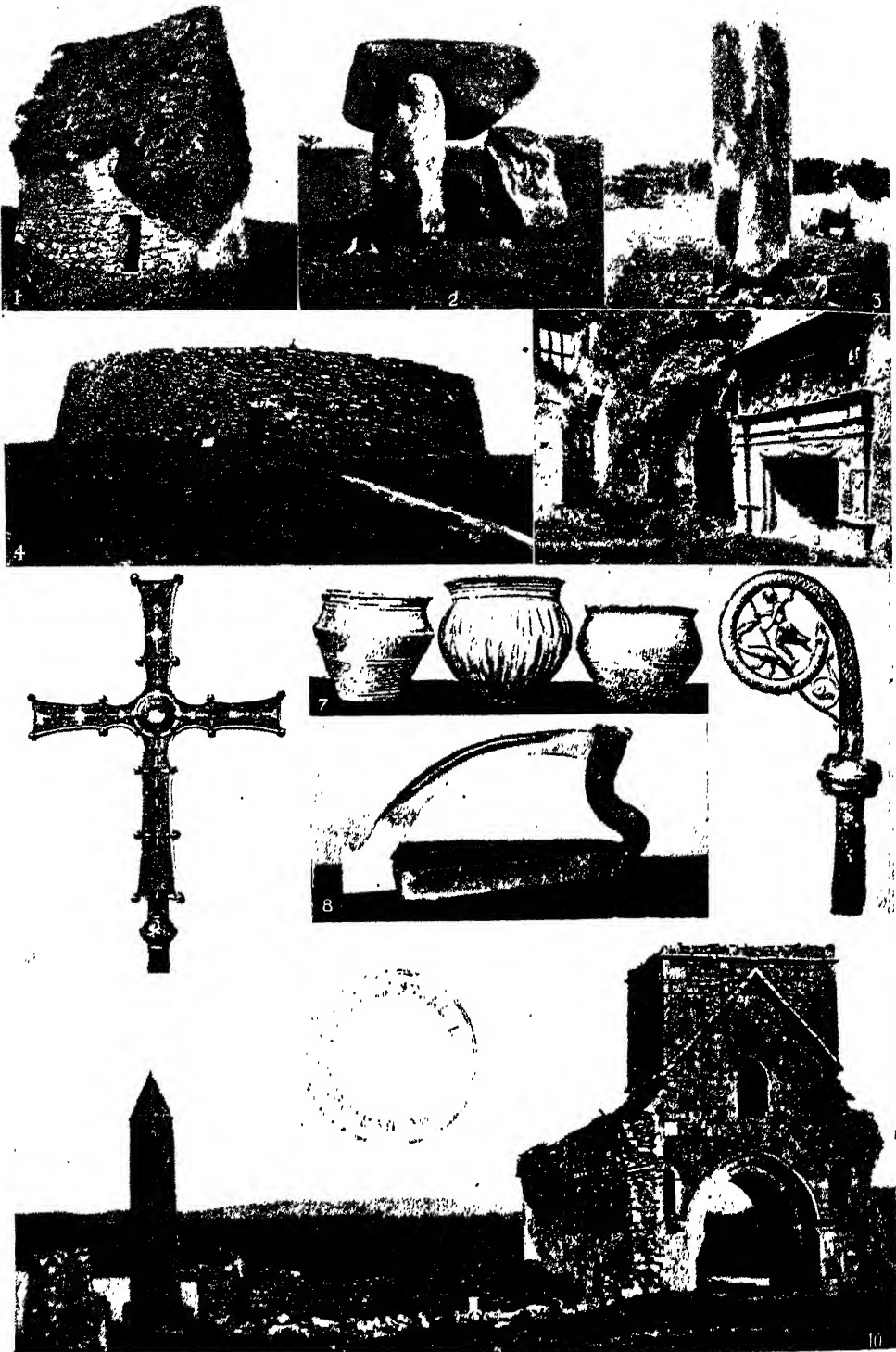
growing unrest. The widespread dissatisfaction became focussed through the society of United Irishmen. This body had aimed first only at reform, but later, particularly after it had been suppressed and had become secret, at an Irish republic under the protection of France. A rising took place in 1798 and was suppressed. As a move to cure Irish discontent, Pitt favoured a union of Ireland with Great Britain. Though generally opposed in Ireland, this was brought about in 1800 through the government's extensive exercise of influence on the Irish parliament. Ireland got 100 members in the U.K. house of commons and 34 representative peers in the house of lords. From this time the Protestant aristocracy lost its lead in Ireland.

At first there was little change in Ireland. Only in 1829, after the agitation of Daniel O'Connell, was political equality at last given to Roman Catholics. After that time it became the wish of both British parties to solve outstanding Irish problems by special legislation. During the 1830s conflict over tithes was dealt with, an Irish poor law established, municipal corporations were reformed, and primary education was extended. Since the close of the 17th century the population of Ireland had steadily increased and had reached 8,175,000 in 1841. Three seasons of potato blight in 1845-47 produced a disastrous famine, for the potato alone had kept great multitudes just up to subsistence level.

Effects of the Great Famine

Many perished of starvation or of the diseases which readily attacked their undernourished constitutions, and a great tide of emigration to the U.S.A. set in. This left Ireland socially and politically immobile for nearly 20 years. Many landlords were ruined and their land passed into the hands of speculators whose activities often worsened the lot of the tenants. Efforts at armed risings by Young Ireland in 1848 and by the Fenians in the 1860s were ineffective.

With the legislation for the disestablishment of the Irish Church in 1868 there began a fresh series of reforms and also fresh agitation in Ireland. The Home Rule Association of Isaac Butt sought local self-government. Later Parnell, with a more uncompromising policy, succeeded Butt; and, with a progressively extending franchise, a solid Irish party came to sit at Westminster. Michael Davitt



1. S. Columba's house at Kells. 2. Ancient dolmen near Newcastle, Down. 3. One of the Ogham stones, showing the notched inscription. 4. Circular stone fort near Derry. 5. Fireplace in the ruined castle of Donegal, 17th century. 6. The Cross of Cong, made in

the 12th century, preserved in the National Museum, Dublin. 7. Cinerary urns from tombs, with typical Celtic designs. 8. Old Irish harp. 9. Ancient crozier. 10. Remains of the monastic house of S. Molaise on Devenish, Lough Erne, with round tower, 85 ft. high

IRELAND: ANTIQUITIES OF PRE-CHRISTIAN AND CHRISTIAN TIMES

founded the Land League, demanding the transfer of land ownership to the tenants. Successive governments met the problems of Irish land by a series of land acts. These did two things. They reformed land tenure in Ireland, giving the tenant security, ownership in any improvements he made, and a controlled level of rent; and at the same time they enabled the tenants to become owners of their land by buying it with government loans which were then repaid, both principal and interest, at a rate which was the equivalent of the old rent or even lower than the former rent. By the early years of the 20th century a revolution had taken place in land ownership in Ireland, most of the old proprietors of landed estates being replaced by a large number of small farmers, each owning his land. Other reforms also came, including extensions of opportunities in education, the establishment of elected county councils, and government assistance in improving production and transport.

Home Rule Controversy

But there remained a solid demand for self-government throughout the south of Ireland. In the north the Protestant community had become strongly Unionist, and a big industrialisation of that area had made economic union with Great Britain extremely important to people of all classes. Gladstone attempted unsuccessfully in 1886 and in 1892 to secure the passing of bills giving limited self-government to Ireland. When the Irish party under John Redmond came to hold the balance of power in the house of commons from 1910, the Home Rule controversy came to the surface once more. There was a powerful organized opposition in Ulster. Over 470,000 people signed an Ulster Covenant pledging themselves to resist Home Rule; and an Ulster Volunteer Force was organized, growing into a body of 110,000 men, many of whom came to be armed.

The issue was not settled when the First Great War began. Both the Ulster Unionists and Redmond's nationalist followers threw their energies into the war effort; but the old Irish nationalist party was now rapidly succeeded by Sinn Féin, a movement devoted to obtaining complete self-government by unilateral action. A small rising in Dublin in 1916, accompanied by the proclamation of an

Irish republic, was easily suppressed and its leaders were executed. This proved to be morally a crucial event. In the 1918 general election Sinn Féin ousted the nationalists, being victorious in 73 constituencies. The 29 successful Sinn Féin candidates who were free of internment or imprisonment formed themselves into Dáil Éireann, which claimed to be the government of the Irish republic. They soon entered into competition and conflict with established authority in every sphere of government activity.

Gradually conditions in Ireland became chaotic as police and officials were murdered and ordinary civil organization broke down. The government strengthened the police with military and with auxiliary police (the "Black-and-Tans"). A Government of Ireland Act passed in 1920 set up two subordinate legislatures within the United Kingdom, one in Belfast for Northern Ireland and one in Dublin for Southern Ireland. This settlement was accepted in the north but ignored in the south. At the close of 1921, after government negotiations with Sinn Féin leaders, articles of agreement were drawn up which led to the establishment in 1922 of the Irish Free State, with status in the Commonwealth similar to that of Canada. Northern Ireland was included in the Free State with power to vote itself out, which it immediately did. [For subsequent events see *under* Irish Republic; Northern Ireland.]

Hugh Shearman

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IRISH LANGUAGE AND LITERATURE. Irish is the principal representative of the Gaelic branch of the Celtic languages. The earliest forms of the language are those found in Ogam inscriptions (on stone) in a special alphabet (not later than 5th century A.D.), but real knowledge of the grammar of old Irish (to 9th century A.D.) is based on a large number of glosses on Latin texts (the Pauline epistles, a commentary on the Psalms, and various grammatical texts) in

codices now on the Continent (Würzburg, Milan, St. Gall).

The earliest MS. containing extensive literature dates from about 1100, and another dates from the 12th century, which is the end of the middle-Irish period. Later MSS. often contain middle Irish material. The modern Irish period extends from the 13th century to the present day. Irish continues to be spoken in restricted areas in the south and west of Ireland (Waterford, Cork, Kerry, Galway, Mayo, Donegal), speakers numbering between 30,000 and 40,000, with not more than 3,000 monoglots. (These figures do not include speakers whose first language is English and who have learnt and use Irish for nationalistic reasons. The teaching of Irish is compulsory in all state and state-aided schools in the twenty-six counties of the Irish Republic.)

Phonetics of Irish

The earliest Irish known shows many changes from the Indo-European type from which it derives. In phonetics one may mention the change of **ē* to *í* (*síl*, seed, Lat. *sēmen*), and the almost complete loss of the consonant **p* (*athir*, father, Lat. *pater*). But the appearance of the language was most radically altered (a) by the loss of final syllables which accompanied a strong stress-accent on the first syllable of the word (*dán*, gift, Lat. *donum*) and (b) by the fact that consonants originally standing between vowels were altered by the process called lenition or aspiration. Thus in the word *athir* quoted above the middle consonant has in modern Irish the pronunciation *h*. A further result of this change was that initial consonants were similarly affected after words originally ending in vowels, for example *an bád*, the boat, *an bháid*, of the boat, where the article *an* originally ended in a vowel and *bh* is pronounced *w*. Where the preceding word originally ended in a nasal the initial was also altered, as in *na mbád*, of the boats, where *mō* has the value *m*. Hence Irish exhibits the peculiarity of inflection at the beginning as well as at the end of the word.

The noun shows up to 12 different declensions with five cases and three numbers. Both simple and compound verbs occur in the earlier language, and in each there are two forms, one used in absolute position and one after adverbs and conjunctions (*marbaid*, he kills, *ní marba*, he does not kill: *as-beir*,

he says, *ní eipir*, he does not say). Pronouns in the accusative are "infixed" (*do-beir*, he brings, *do-sm-beir*, he brings her). In later centuries inflection was considerably reduced. There is, for instance, a tendency in modern Irish to do with two forms only in nouns, a singular and a plural; and compound verbs are almost non-existent.

Ulster and Ossianic Sagas

There is an extensive literature in the Ulster saga, in language going back to the 8th century, is heroic in tone, and deals with the exploits of Cúchulinn (or Cú Chulainn) sometimes called the Irish Achilles, and the royal dynasty of Ulster. The Ossianic saga is later in language, and treats of the hero Finn and his son Oisín. This, thanks to the forgeries of James McPherson, is the most widely known section of the literature, and in the 18th century exercised a considerable influence on European literature.

Mythological stories are also numerous, and in addition mythological elements pervade the two cycles already mentioned. The "voyage-tales" are another category. Here a hero sets off to visit a mythical land in the west, the Celtic Elysium, and this is in some instances hard to distinguish from the Christian theme of the journey to Heaven. The Latin *Navigatio Brendani* must go back to an Irish source. There is a considerable body of verse in old and middle Irish. Some of this occurs in the sagas, but the most attractive poems are undoubtedly those presumably composed by monks up to the 10th or 11th century—exquisite lyrics in which appreciation of nature and religious feeling are skilfully interwoven. In the middle-Irish period verse was also a medium for historical and other lore, the "Metrical Dindshenchas," for instance, being a considerable body of verse on the origins of place names.

The extensive legal texts and saints' lives are for the most part in prose: so also are adaptations of Continental texts like the destruction of Troy, the Aeneid, etc. The early modern period is the classical period both in language and literature (14th–17th centuries). Verse in complicated metres addressed to patrons is in stylised but elegant language, and lyricism is a secondary consideration. The prose of this period is less distinguished than

the verse. Among the works of a number of authors who used the language mainly for pietistic writings the polished prose of Geoffrey Keating (17th century) is unique, his longest work being a history of Ireland.

In the 18th century the main output was in verse, both religious and political. The most popular type of poem was the *aisling*, or vision poem, Jacobite in feeling, in which Ireland was portrayed as an oppressed maiden waiting to be rescued by the true sovereign of Ireland, always a Stuart. In the 19th century the language was fast disappearing as a literary medium. In the present century most attempts to produce literature in Irish have been inspired by the nationalistic movement and may or may not prove enduring. Much has been done to collect the vast body of folklore still alive among native speakers in the west of Ireland.

E. G. QUINN

ANGLO-IRISH LITERATURE. From the late 18th century onwards the chief literary expression of Ireland has been in English. Long before that time there is a literature of the English in Ireland, strongly influenced by experience of an Irish background. The poetry of Spenser and the satire of Swift owe much to the Irish experiences of their authors. There have also been many writers born in Ireland whose work is not in any marked way national or regional. Many such have been dramatists, including Farquhar, Sheridan, Wilde, and Bernard Shaw. They probably owed much to the stimulation of their native background, but their work belongs to English literary history.

There is also a literature written in English, not only by natives of Ireland, but dealing with Irish subjects. The first half of the 19th century saw a new self-consciousness, perhaps at that time more regional than national, and considerable literary activity. The novels of Maria Edgeworth, within their somewhat restricted compass, give a clear picture of life in her times, and the poems of Tom Moore gave a popular currency to the romantic sentiment and patriotic feeling of his country. A little later came the lively novels of Samuel Lover and Charles Lever, who were incidentally responsible for the deceptive portrait of the Irishman as a devil-may-care humorist and who indeed created the kind of stage-

Irishman figure which has been kept alive ever since in the minds of Americans and Englishmen.

The tales of William Carleton are more true to the life they depict than those of his better known contemporaries. He wrote of peasant life in and near co. Monaghan. Less widely known outside Ireland are the Young Ireland writers, such as Thomas Davis and Sir Charles Gavan Duffy who wrote for *The Nation*, a nationalist weekly founded in 1842. Sheridan Le Fanu won a notable position for himself in the middle years of the 19th century as a writer of tales dealing with the occult and the supernatural.

Celtic Revival

A link between the Young Ireland writers and the later revival of interest in Celtic tradition and mythology is to be found in the poems of the Ulsterman, Sir Samuel Ferguson. The Celtic revival in the later years of the 19th century found expression in the writings of Standish O'Grady, Douglas Hyde, Lady Gregory, and George Russell ("A. E."), who attempted in their several ways, scholarly or mystical, to revive interest in the heroic cycles and folk poetry of the Irish past. Round the Irish Literary Theatre founded in 1899 gathered Edward Martyn, W. B. Yeats, and J. M. Synge, who used his knowledge of peasant idiom to fashion plays of great beauty and power. (*See Abbey Theatre*.) In the brilliant and rather satirical *Hail and Farewell* trilogy, George Moore gives an account of the personalities of the Celtic revival. In the north, Forrest Reid wrote his sensitive studies of childhood and youth in which a vein of ancient Attic mysticism was unexpectedly blended with an authentic portrayal of the suburbs of Belfast.

With the advancing years of the 20th century, a realism, sometimes harsh and sordid enough, entered into Anglo-Irish literature, appearing in the plays of O'Casey and the fiction of O'Flaherty. And a more pessimistic questioning of reality appeared in the later poems of Yeats. Yet even the sordid moments and the bleak characters of James Joyce's *Ulysses* are lit up by a lyrical and rhetorical sentimentality that is inescapably Irish.

HUGH SHEARMAN

Ireland, BANK OF. Oldest existing Irish bank, established by an act of the Irish parliament in 1783. It has branches in the Irish

Republic (where it issues notes of the Central Bank) and in Northern Ireland, where it issues its own notes. In 1935 liability of stockholders became unlimited only in respect of note issue. Its head office in College Green, Dublin, is in the old Parliament House where the Irish parliament sat in the 18th century, one of the most distinguished architectural landmarks of Georgian Dublin.

Ireland, CHIEF SECRETARY FOR. Member of the British government until 1922, responsible to the imperial parliament at Westminster for affairs in Ireland. Theoretically he was only the chief secretary to the lord-lieutenant, but in practice he became more significant than his nominal chief. His importance began with the union of the parliaments in 1801.

Ireland, CHURCH OF. The name of the Church which was established by law in Ireland until 1871. It belongs to the Anglican communion and is close to the "low church" wing of the Church of England in doctrine and practice. The church policies of Henry VIII and Elizabeth I were applied to Ireland, the first Act of Supremacy for Ireland being passed in 1537. Most of the existing bishops conformed to the new church settlement, and the episcopal succession was maintained. After vicissitudes in the reigns of Edward VI and Mary I, the Church of Ireland received its permanent form in the reign of Elizabeth I. It was always the church of a minority and was closely associated with the government, the episcopate and higher offices being filled for the most part during long periods by Englishmen or by members of the ruling "ascendancy" class in Ireland. It played an important political rôle, and its bishops were active in the Irish house of lords.

In 1800 it was united by the Act of Union with the Church of England, and some of its bishops took seats in the United Kingdom house of lords. During the late 18th and early 19th centuries there was a considerable increase in its evangelical activity. In 1833 the number of its bishops was reduced, and some dioceses were amalgamated. In 1838 the unpopular tithes by which it had been partly supported were reduced in amount and the liability transferred from occupiers of land to owners.

In 1869 the Church of Ireland was disestablished and became a voluntary church by a law coming into force in 1871. All its property, most of it in land and tithe rent-

charge, was transferred to commissioners who handed back to the Church such church buildings as it required and a sum of £500,000 as compensation for loss of endowments from private benefactors. The Church was allowed to buy back at very cheap rates houses and small glebes for the clergy. The life interests of individual clergymen were compensated for by annuities or by a capital sum representing 12·8 years' purchase of their former incomes. Most of the clergy chose to receive a capital sum which was then administered by a representative church body, a group of trustees representing the Church. At the same time a great effort was made by the laity to raise a sustentation fund to provide capital to replace the compensation money as it was exhausted. This task stirred up great enthusiasm and, though shaken at first by the great changes, the Church expanded in membership and entered upon a new and active phase. The confiscated property was gradually liquidated by the commissioners and the proceeds applied to various social and educational objects under later acts of parliament.

The Church of Ireland has two provinces and two archbishops, those of Armagh (the primatial see) and Dublin. There are 12 bishops. The laity take a big part in the Church's administration, participate in the election of bishops and appointment of clergy, and serve on general and diocesan synods in a proportion of two lay synodsmen to each clergyman. Women can serve equally with men on synods and committees open to laity. Total membership in 1951 was 353,245 in Northern Ireland, and about 125,000 in the Irish Republic. *Consult* Fifty Years of Disestablishment, H. E. Patton, 1922; The History of the Church of Ireland, W. A. Phillips, 3 vols., 1933.

Ireland, NATIONAL UNIVERSITY OF. University founded in 1908 in response to the demand of Irish Roman Catholics for university education. It is in a sense the successor of the Royal University of Ireland, dissolved in that year. It comprises three colleges: University College, Cork, and University College, Galway (both founded in 1845 and part of the old Royal University) and University College Dublin (founded 1909). Irish is obligatory at the matriculation examination.

Ireland, PROVINCIAL BANK OF. Commercial bank, with branches

in both the Irish Republic and Northern Ireland. Founded 1825, it was registered as a limited co. 1882. The bank issues Central Bank notes in the Irish Republic and its own notes in N. Ireland. Its head office is at 5, College Street, Dublin.

Ireland, REPUBLIC OF. See Irish Republic.

Ireland, JOHN (b. 1879). British composer. Born at Bowden, Cheshire, Aug. 13, 1879, he was educated at Leeds grammar school, and studied composition under Stanford at the R.C.M. His first important work, The Forgotten Rite, was performed in 1912; his second sonata for violin and piano, 1917, established his reputation. Though often impressionistic in feeling, Ireland's work is classical in style. His chief compositions include the symphonic rhapsody, Maidun, 1921; sonata for cello and piano, 1923; piano concerto, 1930; Legend for piano and orchestra, 1934;



John Ireland,
British composer

London overture, 1936; These Things Shall Be, for chorus and orchestra, 1937; Concertino Pastorale for string orchestra, 1939; Epic march, 1942. Of his numerous songs the setting of Masfield's Sea Fever attained greatest popularity. Ireland was professor of composition at the R.C.M.

Ireland, WILLIAM HENRY (1777-1835). English forger of Shakespearian manuscripts. Born in London, son of a seller of second-hand books and prints, at 17 he deceived his father with a fictitious old lease bearing the autograph of Shakespeare. He then produced a succession of Shakespearian forgeries, consisting of private letters and annotations on fly-leaves of books, which deceived such men as Boswell and Pye, then poet laureate. Young Ireland declared that they had been given him by a wealthy gentleman whom he knew only by his initials. The climax was reached when he presented his father with a whole play entitled Vortigern, alleged to be the work of Shakespeare. The play was produced by Sheridan, with Kemble in the cast, at Drury Lane on April 2, 1796. It was a total failure, and this, combined with the growing doubts as to the authenticity of Ireland's Shakespearian relics, demolished the fabric of fraud. Ireland confessed his

guilt, publishing a volume entitled *Confessions* in 1805. Thereafter he dragged out a precarious existence, writing novels, poems, and miscellaneous works until his death, April 17, 1835.

Irenaeus (c. 130–202). Saint and bishop of Lyons. He is supposed to have been born at Smyrna (Izmir) and educated under Polycarp. Coming to France in early manhood he became a priest at Lyons, succeeding Pothinus in the bishopric in 177. He preached Christianity to the Gauls, and helped to settle the dispute between the bishop of Rome and the Asiatic Churches on the question of the date of Easter. He is said to have been martyred under Severus. Irenaeus wrote in Greek a treatise against heresies, some fragments of which, together with a complete Latin version, are extant. His festival is kept on June 28.

Irene (Gr. Εἰρήνη). In Greek mythology, the goddess of peace, daughter of Zeus and Themis. She was worshipped by the Romans under the name of Pax. As a given name, Irene was introduced into England from Russia. *Protn. i-ree-nee.*

Irene (752–803). An east Roman empress 797–802. Of a distinguished Athenian family, she became the wife of Leo IV. After his death in 780 she acted as regent for their son Constantine VI. Irene was a strong anti-iconoclast, and at the council of Nicaea, 787, reverence for (though not adoration of) images was restored. When in 797 Constantine attempted to free himself from her control she had his eyes put out, and for five years reigned alone. Charlemagne contemplated marriage with her in order to unite the two empires, but disgust with her government by favourites led to a conspiracy, and she was deposed and banished to the island of Lesbos, where she died.

Irene was also the name of the wife of Alexius I Comnenus.

Ireton, HENRY (1611–51). English soldier. Born at Attenborough, near Nottingham, he was educated at Trinity College, Oxford, studied law, and was living in London when the Civil War began. He joined the Parliamentary forces and was soon associated with Cromwell in Lincolnshire. He was at Marston Moor and Newbury; at Naseby he led the left wing of Cromwell's army, being routed and made prisoner, only to be released by the victorious Cromwell.

In 1645 Ireton entered parliament as M.P. for Appleby. He

drafted the Heads of the Proposals and his efforts were directed towards bringing about peace by reuniting the moderate men of both parties. When this failed he took an active part in the renewal of war, and was one of the king's judges, signing the death warrant.



Henry Ireton,
English soldier
From a portrait in
the National Portrait
Gallery

Later in 1649 Ireton went to Ireland, and when Cromwell returned was left as lord deputy. He had taken Waterford and Limerick when he died of the plague, Nov. 26, 1651. He was buried in Westminster Abbey, but at the Restoration the body was exhumed and hanged at Tyburn. In 1646 Ireton married Cromwell's daughter, Bridget.

Irgun. Jewish terrorist organization, the full title of which was Irgun Zvi Le-umi C'Eretz Israel (national military organization in the land of Israel). It began as the fighting force of the right-wing revisionists who, during the Arab disturbances in Palestine, 1936–39, decided to retaliate against the Arabs, despite the official Jewish policy of self-restraint. After the Second Great War, Irgun initiated a campaign of murder, kidnapping, and destruction with a view to compelling the British government to set up a Jewish state in Palestine and Transjordan. It was disowned by the Jewish agency for Palestine, and outlawed by the Israeli govt., 1948. Assuming the name Heruth (freedom) party, it took its place as a political party of Israel.

Irian. Indonesian name for New Guinea.

Iridaceae. A family of perennial herbs, with a thick, creeping rootstock, or forming a tuber or corm. The leaves are sword-shaped or grass-like, the bases often folding over younger leaves. The flowers are regular or irregular, and the sepals and petals coloured alike and united at the base. There are three stamens; the ovary is three-celled; and the capsule three-sided, three-celled, and three-valved, containing numerous seeds. Iridaceae are widely distributed, but chiefly in countries outside the tropics, among them are iris, crocus, and gladiolus.

Iridescence (Gr. *iris*, rainbow). Intermingling and interchange of the spectrum colours on surfaces.

Typical surfaces which produce iridescence are those of soap bubbles or mother-of-pearl. Minute irregularities of the surface, in reflecting white light, split it up into its constituent colours by the phenomenon of interference.

A beautiful meteorological phenomenon is the rarely seen iridescent or mother-of-pearl cloud. These lenticular shaped clouds, consisting of minute water drops cooled to well below freezing point, lie within the stratosphere at a height of 14–18 miles above the earth. The strongest prismatic colorations have been observed either shortly after sunset or just before sunrise, at angular distances up to 40° from the sun. Mother-of-pearl clouds apparently occur most frequently in winter over Norway. The iridescence is probably due to diffraction of light by the small water drops.

A mineral shows iridescence when it exhibits a play of prismatic colours in its interior or on its surface. This may be due to the presence of oriented minute inclusions, but more generally is caused by interference phenomena of light reflected from the fine cleavage-lamellae. This is analogous to the well-known Newton's rings (*q.v.*).

Iridium (Gr. *iris*, rainbow). One of the metals of the platinum group. Discovered in 1804 by Tennant, it occurs in nature as the elemental 'metal' in alloys with platinum, grains of which are found in the platinum mines in the Urals, Burma, and at Sudbury, Ont. It is obtained chiefly as a by-product from the residues from electrolytic refineries of nickel and copper. It is always associated with other metals, particularly osmium, and the separation is intricate. A series of extractions with acids and fusions is performed until ammonium chloriridate is obtained; this is purified by fractional crystallisation and ignited in hydrogen to give pure iridium. Iridium and osmium sometimes occur in gold dust.

The element, chemical symbol Ir, is in the eighth group of the periodic table. The atomic number is 77; atomic weight, 193.1; melting point, 2,435° C.; boiling point, about 4,400° C.; crystal form, face-centred cube, with lattice constant $a = 3.831$, and an interatomic distance of 2.709 angstrom units. The metal is white and looks like steel, but is extremely hard and brittle, with a Brinell hardness of 172 as cast. The compact metal is insoluble in

all acids, although aqua regia will dissolve the powder slowly. It may be worked at white heat into wire or rod, and iridium crucibles have been used for analytical work. An alloy with 7 p.c. of phosphorus added is much more fusible and is used for tipping the nibs of fountain pens. Added to platinum in amounts between 10 and 25 p.c. iridium yields a hard alloy, used for magnetic points in aircraft, all forms of electrical contacts, fine bearings for compasses and watches, and standard weights and measures.

Iridosmine. Mineral containing iridium and osmium in different proportions, forming an isomorphous series. Examples containing more iridium than osmium are called iridosmine; when osmium is in excess the mineral is siserskite. It occurs as irregular flattened grains (crystal, rhombohedral) with tin-white to steel-grey colour, metallic lustre, high specific gravity. It is found with platinum in various parts of the U.S.S.R.; in gold-bearing conglomerates of the Rand, S. Africa; and in gold sands of California. See also Osmiridium.

Irigoyen, HIPOLITO (c. 1855-1933). President of Argentina. Born of Spanish-Basque stock at Buenos Aires, he was educated there, and in 1878 was elected to the provincial legislature. For 30 years leader of the radical party, he became president in 1916, preserving Argentinian neutrality in the First Great War, and persevering with his policy of social pacification. He resigned in 1922, but his prestige with the working classes again brought him the presidency in 1928. He negotiated the D'Abernon trade agreement with Great Britain, 1929. But his second period of office was marked by autocratic tendencies and corruption; it culminated in his overthrow by revolution on Sept. 6, 1930. He died July 3, 1933.

Iris (Gr. rainbow). In Greek mythology, the messenger of the gods, more especially of Hera, and the personification of the rainbow.

Iris. One of the asteroids, seventh in order of discovery. It was first observed by Hind in 1847.

Iris. Large genus of perennial herbs often referred to as flags: gardeners regard the rhizomatous section as flags and the bulbous section as irises. They divide irises into English irises and Spanish irises; but no bulbous iris is native to the U.K. The common flag with purple flowers is *Iris germanica* from central and S. Europe, intro-

duced as far back as 1573. It will do well anywhere, under most unpromising conditions, but abundantly repays a little care. The Florentine flag (*I. florentina*), with delicate lavender-tinted flowers, furnishes the orris-root of the druggist and perfumer. The golden flag (*I. aurea*) comes from the W. Himalayas. Japanese flag (*I. laevigata*), with magnificent bright purple flowers, requires abundant moisture and does best at the edge of ponds. Primrose flag (*I. champeiris*) has pale yellow flowers netted with purple-brown; the dwarf flag (*I. pumila*), though its lilac-purple flowers are large, is only about 5 ins. high. All these should be planted by preference in light, rich soil with the upper part of the rhizomes exposed. The so-called English and Spanish irises, with their Asiatic relations and numerous garden varieties, should be planted in clumps deeply in well-drained sandy soil and left undisturbed.

Iris. The membrane surrounding the pupil of the eye. It has the power of contracting or enlarging in order to regulate the amount of light which enters the eye, and also acts as a diaphragm to cut off rays passing through the margin of the lens and thus lessen spherical aberration when a clear image of a near object is required. The outer layer of the iris of black or brown eyes is pigmented, but lacks pigment in blue eyes.

Iritis, or inflammation of the iris, may be acute or chronic. The condition may follow an injury to the eye, but is more frequently due to tuberculosis, syphilis, gonorrhoea, or other toxic cause. In acute cases there is severe pain, with contraction of the pupil, changes in the colour of the iris, loss of lustre, dimness of vision, intolerance of light, and constant watering of the eye. There is often a zone of redness round the margin of the pupil. Any inflammation of the eye should be seen by a physician, for failure to diagnose this condition correctly can lead to serious consequences.

In photography an iris diaphragm provides a means of controlling the size of the aperture in a lens, a circle at the centre of the lens opening and closing like the iris of the eye.

Irish Academy, ROYAL. Irish learned society. Dating from 1782, when some members of Dublin University started weekly meetings "for promoting the study of science, polite literature, and antiquities," it received a charter

from the king in 1786, and in 1788 began to issue its Transactions. It possesses a valuable library rich in MSS. of the early history, antiquities, and language of Ireland, including the famous Annals of the Four Masters. Its address is 19, Dawson Street, Dublin.

Irish Bases. Collective name given to the former British naval bases at Cobh, Lough Swilly, and Berehaven. These bases were essential to the defence of the western approaches in the First Great War both for anti-submarine patrols and as centres of the Admiralty ship-salvage organization. Under the Anglo-Irish treaty of 1921, the defence by sea of Great Britain and Ireland was undertaken by Imperial forces until arrangements had been made whereby the Irish Free State took over its own coastal defences. The Free State government agreed to give the necessary harbour facilities to the Royal Navy. By the Anglo-Irish agreement of 1938, Eire became responsible for its coastal defence, the U.K. handing over the Admiralty property and rights at Berehaven, Cobh, and Lough Swilly. The transfer was originally fixed for Dec., but in view of the uncertain international situation the bases were taken over by Eire on Sept. 29.

When Eire declared its neutrality at the outbreak of the Second Great War, it declined to grant the Royal Navy any facilities for bases. Lack of facilities for combating German submarine and aircraft activity in the Irish Sea and the Atlantic approaches obliged the British and U.S. governments to build a large naval and air base at Londonderry, but this was of less value strategically than the former bases in southern Ireland. A suggestion in 1941 that these should be leased by the Allies was dismissed by Eamon De Valera, and opposed by many U.S. citizens of Irish origin.

Irish Free State (Saorstát Éireann). Name under which the state renamed the Republic of Ireland in 1949 achieved, 1922, independence from Great Britain by the treaty of 1921.

Irish Fusiliers, ROYAL. Regt. of the British army. It was formed in 1881 by amalgamating the 87th and 89th Foot. The 87th was raised in 1793 and fought on the Continent the following year. It served with Abercromby in Egypt and won eight battle honours under Wellington in the Peninsula. Sergeant Masterson in this campaign captured the first French

eagle taken by the British army. The regt. took part in the Crimean War, the Egyptian campaign of 1882, the Burmese War of 1885, and in the S. African War as the relief of Ladysmith.

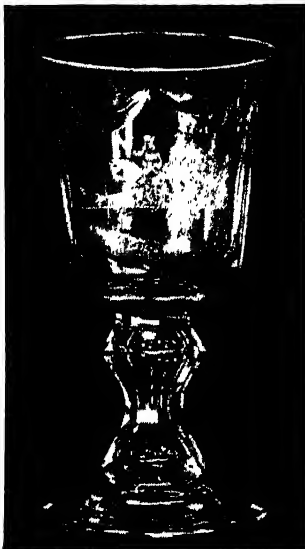


Irish Fusiliers badge

Fourteen battalions were raised for service in the First Great War and gained the honours: Le Cateau; Marne, 1914; Ypres, 1915. '17, '18; Somme, 1916, '18; Arras, 1917; Messines, 1917, '18; Lys; Macedonia, 1915, '17; Suva; Palestine. In 1922 the regiment was reduced to one battalion and linked administratively with the Royal Inniskilling Fusiliers. In 1937 it resumed independent existence with two battalions, of which one served in Africa and Italy and the other in Burma during the course of the Second Great War.

Irish Glass. Fine glassware formerly produced in Ireland where glass-making, once a flourishing industry, has virtually ceased. The industry dated from shortly after the introduction of glass-making into England, about the middle of the 14th century. Flint-glass was invented early in the 17th century.

This kind of glass, of which a main constituent is oxide of lead, appealed especially to the Irish craftsman, since the material was found in abundance in his country,



Irish Glass. Goblet, formerly belonging to an Orange Lodge, in the Dublin Museum

and flint-glass lent itself, as Venetian and other Continental varieties did not, to the art of glass-cutting. In the 18th century there were 22 flint-glass factories in Ireland, most of them at Waterford, Cork, and Newry. Among them was the famous glass house at Waterford. By the beginning of the 19th century the number of manufactories had been reduced to 15, and most of these had vanished by 1850. The Waterford glass house was closed down shortly afterwards owing to a strike of the workers.

Waterford glass, so much prized by connoisseurs, was at its best in the late 18th and early 19th centuries. Specimens of this date are often exquisitely cut, and always have a characteristic and unmistakable tinge of smokiness due to the presence of excessive oxide of lead. Cork-made glass is duller than Waterford, with a pale yellowish tinge, and old Belfast glass is also yellowish. Waterford glass is the heaviest. Tint and weight apart, the style of all three is much the same. The cutting tends to be shallow, and its lines can be described as curved and flowing, as opposed to the English style of diamond-shaped cutting.

Irish Guards. Regiment of the British army. Formed in 1900 to acknowledge the gallantry of Irish regiments in the S. African War, it was raised from volunteers from the other regiments of Foot Guards and served through the remainder of the war as mounted infantry. Its first public function was to mount the guard of honour at the reception by the prince of Wales (afterwards Edward VII) of Lord Roberts on that general's return from S. Africa.

The Irish Guards raised three battalions for service in the First Great War and won the battle honours: Retreat from Mons; Marne, 1914; Aisne, 1914; Ypres, 1914, '18; Festubert, 1915; Loos; Somme, 1916, '18; Hazebrouck; and Hindenburg Line. In the Second Great War the Irish Guards covered the evacuation of Queen Wilhelmina and the Netherlands govt. from the Hook of Holland, and held Boulogne during the retreat to Dunkirk. The 1st battalion served in Norway, N. Africa, and Italy, and the 1st and 3rd battalions with the Guards armoured division in the liberation of Europe.



Irish Guards badge



Irish Moss. Frond of the seaweed formerly used for food

Irish Moss (*Chondrus crispus*). Small seaweed of the family Rhodophyceae, growing on rocks about low-water mark. The frond is flat, thick, and cartilaginous, repeatedly forking in one plane, varying in colour from greenish-white to dull purple. Under the name of carrageen, being gelatinous and easily digested, it was formerly prescribed for invalids.

Irish Players. Popular name for the players associated with the Irish National Theatre Society. See Abbey Theatre.

Irish Regiment, ROYAL. Former unit of the British army. Raised in 1683 from independent companies, it became the 18th Foot and under William III fought at the Boyne and Limerick. It greatly distinguished itself at the assault on Namur in 1695 and served with Marlborough at Blenheim. The regiment fought under Abercromby in Egypt; in China, 1840; Burma; the Crimea; New Zealand, 1863-1866; Afghanistan, 1879; Egypt, 1882; and S. Africa, 1899-1902. Nine battalions were raised in the First Great War, fighting in France, Flanders, Gallipoli, Palestine, and Macedonia. On the inauguration of the Irish Free State, the regiment was disbanded in 1922.

Irish Republic. THE. Country of Europe, part of Ireland, one of the British Isles. (For a general geographical description see the article on Ireland.) The Republic, 27,140 sq. m. in total area (including 540 sq. m. of water), is surrounded by the ocean except for a 200-m. land frontier with Northern Ireland. The capital city is Dublin; other cities are Cork, Limerick, Dún Laoghaire (which serves Dublin as a port), Waterford, and Galway, and there



Royal Irish Regimental badge

are many smaller towns. Pop. (1956) 2,894,822.

The Republic consists of 26 counties :

	Area sq. m.	Pop. (1956)
Carlow	346.0	33,854
Cavan	729.9	61,723
Clare	1,230.8	77,107
Cork	2,880.3	336,687
Donegal	1,865.0	122,061
Dublin	356.0	703,490
Galway	2,293.2	155,441
Kerry	1,815.2	121,823
Kildare	657.2	65,927
Kilkenny	796.0	64,148
Laoighis (Leix)	663.9	47,042
Leitrim	588.7	37,023
Limerick	1,036.9	137,770
Longford	403.0	32,884
Louth	316.9	69,264
Mayo	2,084.3	133,036
Meath	902.8	66,689
Monaghan	498.4	52,013
Offaly	771.3	51,917
Roscommon	950.9	63,675
Sligo	693.6	56,828
Tipperary	1,642.6	129,231
Waterford	709.8	74,002
Westmeath	680.6	54,128
Wexford	907.9	87,236
Wicklow	781.6	59,818
Totals	26,600.1	2,894,822

RESOURCES AND TRADE. During the early 1950s more than half the land was in use for pasture or hay. A further fifth of the land surface was used for corn, root, and green crops, the largest acreages being devoted to oats and potatoes. Root crops providing feeding stuffs for cattle also accounted for a considerable acreage. Livestock and livestock products were by far the most valuable produce of the land and normally account for nearly two-thirds of the country's total annual exports. The Republic has few mineral resources and its relatively small industries cater in the main for home consumption. There is a small export of textile goods. There is no substantial native coal, and the configuration of the country does not provide extensive sources of hydro-electricity; but the r. Shannon is harnessed to provide electric power, and there are smaller power schemes in the Wicklow Mts. Turf (peat) is often used as rural domestic fuel.

The total volume of trade, exports and imports, fluctuates round £300 million, with the balance heavily on the side of imports. The Republic has its own coinage, issued by the ministry of finance through the banks. The Irish pound has the same value as the pound sterling. The Central Bank, established in 1942, has the sole right of issuing legal tender notes.

COMMUNICATIONS. The main railway lines are nationalised under a transport board, Corás Iom-

pair Éireann (C.I.E.). The Great Northern Railway, including the main line across the frontier between Dublin and Belfast, is operated jointly by the governments of the Republic and of Northern Ireland. A road transport system is operated by C.I.E.

The principal harbours are Dublin, Cobh, Dún Laoghaire (Kingstown), Cork, Galway, Rosslare, Limerick, and Waterford. Services run between Holyhead and Dun Laoghaire, Liverpool and Dublin, Fishguard and the southern ports. There are regular air services between Dublin airport and several of the principal cities in Great Britain. Shannon airport serves as a terminal for trans-Atlantic services.

EDUCATION, RELIGION, CULTURE. The three University Colleges of Dublin, Cork, and Galway are the constituent colleges of the National University of Ireland. Dublin University has one college, Trinity College, Dublin. St. Patrick's College, Maynooth, a R.C. theological college, also provides an arts course and confers degrees. There are more than 450 secondary schools under private control, chiefly of the religious orders. The department of education inspects schools, provides grants, and conducts examinations. There are 4,800 national elementary schools. Some vocational and agricultural education is provided by local and county committees, financed partly by the state and partly from local rates. There are six state-aided training colleges for teachers.

The Irish Language

The Irish language is taught in all schools, and a knowledge of it is essential for most forms of public employment. But English is the spoken language of the country except in a very few rural areas.

The great majority of the people belong to the R.C. Church, some 125,000 to the Church of Ireland (Anglican), and some 24,000 are Presbyterians.

During the period since the founding of the Irish Free State there has been an active literary and artistic life, centred mainly on Dublin. Many of the best known writers of Irish birth, including Bernard Shaw, James Joyce, and to a less extent, W. B. Yeats, have chosen to live outside Ireland.

The romantic nationalism and the themes that had inspired the Anglo-Irish literary movement at the beginning of the 20th century withered away, to be replaced by a

realism which was sometimes disillusioned. In drama this new tendency found expression in the work of Sean O'Casey, in fiction in that of Liam O'Flaherty. Other dramatists included Lennox Robinson, Daniel Corkery, T. C. Murray, and Denis Johnston; among writers of fiction were Frank O'Connor, Seán O'Faolain, and Elizabeth Bowen. Poets included Padraic Colum and Lord Dunsany, also actively productive prose writers. There was also an able group of painters, among them J. B. Yeats, the poet's brother.

Some of the institutions caring for the cultural life of the Republic, e.g. the Royal Irish Academy, concerned with historical and antiquarian pursuits, the Royal Hibernian Academy, concerned with art, survive from an earlier period. Others founded after the establishment of the Free State include the Irish Academy of Letters and the Censorship Board, concerned with literature; and the Institute of Advanced Studies, which has devoted much of its energies to Gaelic, but has also done service to mathematical physics.

Irish Free State Created

CONSTITUTION AND HISTORY. The formal history of the Irish Republic is generally regarded as opening with the signing on Dec. 6, 1921, of the Articles of Agreement between the United Kingdom government and the leaders of Sinn Féin. This agreement, popularly known as "the Treaty," laid down the principles upon which the Irish Free State was to be established as a member state of the British Commonwealth, similar in status to Canada. But a republican tradition had existed in Ireland in association with movements in favour of self-government since the close of the 18th century (see Ireland: History).

This background conditioned all that followed. The agreement was a compromise. It was approved by the U.K. parliament and by a majority of members of the parliament of "Southern Ireland" which had been established by the Government of Ireland Act, 1920. In accordance with the Articles of Agreement, the Irish Free State became a member of the British Commonwealth. Arthur Griffith, head of the new government, died in 1922; W. T. Cosgrave succeeded him.

A large minority of Sinn Féin deputies had voted against the agreement. Under the leadership of Eamon De Valera, the opponents

of the agreement repudiated it, and a bitter and ruthless civil war followed.

Meanwhile the government of the Irish Free State was given its constitution. The crown was represented by a governor-general, and there were two houses in the legislature. The upper house or senate, of 60 members, was at first elected by all citizens over 30 and later filled by indirect election and nomination. The lower house, then of 153 members, was elected by universal suffrage. W. T. Cosgrave's party, later called Cumann na nGaedheal, formed the government. Without political experience, this did good administrative work, established and pacified the new state, and conciliated some of its opponents. Its chief opponents, the followers of De Valera, though winning 39 seats in the 1923 general election, did not take their seats.

In 1924 a boundary commission failed to reach agreement on the Free State's frontier with Northern Ireland, owing to the withdrawal of the Free State representative on it; and the Cosgrave government in 1925 therefore entered into a tripartite treaty with the governments of the U.K. and of Northern Ireland, recognizing the existing frontiers.

Sporadic violence continued in the country, and in 1927 Kevin O'Higgins, vice-president of the executive council or cabinet, Cosgrave's chief colleague, was assassinated on a public road on his way to church.

Fianna Fáil enters the Dáil

In 1927 De Valera and his followers, the Fianna Fáil party, took the oath of allegiance prescribed in the constitution, declaring at the same time that they did not regard it as a binding oath but only as an empty formula. They thus qualified to take their places in the Dáil or lower house of the legislature. In the second general election of 1927 they secured 57 seats against Cumann na nGaedheal's 61. In 1931 De Valera's party overthrew the Cosgrave government and formed a Fianna Fáil government which lasted seventeen years.

De Valera's government proceeded to remove one by one the various constitutional links with the Commonwealth—the oath of allegiance, appeals to the privy council, the authority of the governor-general. The passing of the Statute of Westminster in 1931 had rendered these changes easier

to make and to accept; but the status of the Articles of Agreement of 1921 became obscure, for they had the character of a treaty and were not legislation. All connexion with the Commonwealth was not ended, and De Valera favoured what he termed "external association" with it. In 1936 the office of governor-general was abolished, and so was the royal assent to legislation; but an External Relations Act was passed recognizing the association of the Free State with the Commonwealth and authorising the sovereign, as head of the Commonwealth, to act with respect to diplomatic and consular representatives on the advice of the executive council of the Free State. About the same time the senate was abolished.

Tariff War with Great Britain

Parallel with the new political policy was an economic policy which was made acceptable to the Irish public by being associated with political issues. Irish republican sentiment had always regarded economic self-sufficiency as the counterpart of political independence. By a one-sided abrogation of agreements which had been made between the governments of the U.K. and of the Free State with regard to repayments of loans raised in the past to finance the Irish Land Purchase Acts, the Free State government provoked the British government to retaliatory duties on Irish agricultural imports in order to make good the Irish government's default. The Dublin government in turn extended tariffs against British manufactured goods.

The effect of this "economic war" was to stimulate a number of Irish industries and to cause a healthy swing in Irish agriculture from cattle-farming to increased crop-raising, but in general its effect was depressive. In 1929 all but 6 p.c. of the Free State's exports had gone to Commonwealth countries, and 92.8 p.c. had gone to the United Kingdom. By 1938, after four years of the "economic war," the country's exports to foreign countries had been raised only to 7.2 p.c., and over half its imports were still coming from the U.K. There had been a sharp increase in the balance of imports over exports. Moreover, the political frontier between the Free State and Northern Ireland was now a formidable economic barrier, and the motives of the northerners for remaining within the U.K. were strengthened.

In 1937 a new constitution was adopted, approved by the Dáil and endorsed by a public referendum. This declared Eire or Ireland to be a sovereign independent state. The term Free State was dropped. Under it the president (Uachtarán) was elected by universal adult franchise for seven years. The legislature (Oireachtas) consisted of two houses, the lower house or Dáil remaining much as before, and the upper house or senate consisting of 60 persons, eleven nominated by the prime minister (an Taoiseach), six by the universities, and 43 on a vocational basis. The constitution also laid down certain general principles of social policy, pledged special care for the institution of marriage, and gave recognition to the "special position" of the R.C. church.

The U.K. government with the consent of the other Commonwealth governments, declared that it would continue to regard Eire as a member of the Commonwealth. The External Relations Act remained in operation as before. In 1938 outstanding differences between the U.K. government and Eire were cleared up by an agreement under which Eire paid a lump sum of £10,000,000 in settlement of all outstanding financial claims and the U.K. government handed over to Eire certain strategic bases which it had held in Ireland under the agreement of 1921.

Eire Neutral in Second Great War

When war broke out in 1939, Eire remained neutral. German, Italian, and Japanese diplomatic or consular personnel remained in Dublin. Northern Ireland, as part of the U.K. and with the concurrence of its parliament and public, was involved in the war, a circumstance that threw into sharp relief the differences of politics and sympathies between Eire and Northern Ireland.

Although home produced food was adequate, there was an acute shortage in Eire of some commodities, particularly coal, petroleum, and petroleum products. A good many Eire citizens joined the British forces, and large numbers found employment in industry in Great Britain. Chiefly as the result of this export of labour, aided by a concurrent absence of opportunity to spend, Eire had a favourable sterling balance estimated at about £400,000,000 at the close of the war.

The Fianna Fáil government was replaced in 1948 by a coalition government led by J. A. Costello.

leader of the Fine Gael party which was the successor of the earlier Cumann na nGaedheal and formed the chief ingredient in the coalition. This government declared itself in favour of a completely republican constitution outside the Commonwealth. The External Relations Act of 1936 was repealed and legislation formally making the country a republic came into operation on April 18, 1949. This involved no serious change in the constitution of 1937. Legislation in the U.K. at the same time threw open most of the advantages of U.K. citizenship to citizens of the Irish Republic, so that the change made little difference to most individuals. The U.K. continued to provide the Republic with a market for half its exported goods. By its small size and its very vulnerability and by the propinquity of Great Britain, the Republic was saved from the heavy defence budgets of most other countries, and its military establishment was placed at 13,000 persons, including air corps and navy, with about 24,000 in reserves. In 1956 the Republic was admitted to membership of the United Nations.

The post-war years saw a decline in tillage, adverse trade balances, and a rapid exhaustion of the sterling balance accumulated in war-time; but emigration on a large scale, chiefly to Great Britain, prevented heavy unemployment or other social repercussions.

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Irish Republican Army. Name used by Irish guerrilla forces which fought against the British in Ireland during 1916-21, and later against the forces of the Irish Free State and the Irish Republic. The I.R.A., which at its greatest strength in 1920 never exceeded 15,000, was an offshoot of the Irish Volunteers formed in 1913 "to secure and maintain the rights and liberties common to all the people of Ireland." In 1914 adherents succeeded in smuggling ashore, at Howth, some 1,500 second-hand rifles from Germany; from this may be dated the formation of a "military" force. All training was in secret, usually by night and in the mountains.

The Volunteers played, with the Irish Citizen Army, an important part in the Dublin rising of 1916. Soon afterwards they were reorganized and renamed. Until the Articles of Agreement were signed by the British govt. and the leaders of Sinn Féin on Dec. 6, 1921, they carried on an incessant struggle against British forces by ambush and assassination. On the establishment of the provisional government there was a serious cleavage in the I.R.A. ranks, many deserting from what was the legalised Free State army. These "irregulars" were directed by the Irish Republican Brotherhood against the government and made ready for civil war. In March, 1922, the I.R.A. repudiated the authority of the Dáil and occupied the Four Courts and Kilmainham goal in Dublin, from which they were driven by Free State forces. Some I.R.A. leaders were executed and the organization was declared illegal. It continued active as an underground movement, aiming at the reunion of north and south Ireland by force and its complete secession from the British Commonwealth. In 1938-39, I.R.A. members perpetrated a series of bomb outrages in London and other English towns. In July, 1939, the British govt. expelled from Great Britain many I.R.A. members suspected of Nazi sympathies. Following an I.R.A. raid on Phoenix Park Arsenal, Dublin, in Dec. 1939, the Eire police rounded up and interned a number of I.R.A. suspects. The organization continued in existence, with a strength of some 5,000 governed by a supreme army council, or inner circle, and in 1956 began a new series of petty but death-dealing outrages against the Republic's govt. and across the Northern Ireland border.

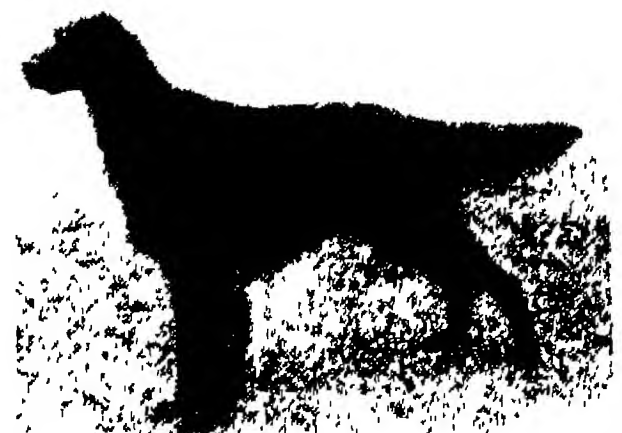
Irish Sea. That part of the shallow British seas situated between the S.W. of Scotland, the E. of Ireland, and the W. of England



Irish Terrier. A champion specimen

and Wales. It is connected with the Atlantic Ocean by the North Channel on the N. and S. George's Channel on the S. Extreme breadth 150 m.; mean depth 210 ft.

Irish Setter. Breed of dog which originated in Ireland, possibly evolved from red and white



Irish Setter. A champion specimen

spaniels. The Irish setter is similar in type to other setter breeds, but is more racy built, with long, lean head, deep muzzle, arched neck, and deep but rather narrow chest. The coat is short on head, front of legs, and tips of ears, but moderately long elsewhere, flat and free from curl; the tail is fringed. The colour is rich chestnut, with no trace of black. There is no official standard of height or weight, but the Irish setter is about the size of the English.

Irish Sweepstake. Public lottery held in Dublin, Irish Republic, and founded in 1930 by six hospitals. Acts of 1931 and 1933 brought it under government control. Its profits assist hospitals all over the Republic. It is held three times a year, on the Grand National, Derby, and Cambridgeshire, 75 p.c. of money from the sale of tickets, after deduction of expenses, being given in prizes, and 25 p.c. going to the Hospitals Trust Board. Up to 1957 over £37,000,000 went to hospitals and the Red Cross, and over £92,000,000 in prizes. Originally there was a "jackpot" prize of £350,000; but in later years the prize money was divided up into units, thus providing a number of smaller prizes. It is illegal to sell tickets in the U.K.

Irish Terrier. One of the larger terrier breeds, evolved in Ireland and first seen in the show ring in Dublin in 1873, when it was much smaller. It is lively and active, with a long head, small eyes, and a deep but narrow chest. The coat is rough and wiry but not too long, and without curl. In colour it is bright red, red wheaten, or red yellow. Dogs should weigh 27 lb., bitches 25 lb. This dog is affectionate and courageous, and a great killer of vermin.

Irish Water Spaniel. See Spaniel.

Irish Wolfhound. A very ancient breed of dog of the greyhound family, well known in Ireland for centuries until it almost disappeared with the extinction of wolves at the beginning of the 18th century. About 1850 the breed was revived with the help of the deerhound which, though larger, the wolfhound resembles. The tallest dogs in existence, wolfhounds are less heavy and massive than the Great Dane, strongly and gracefully built. The coat is rough, hard, and wiry; colours are grey, brindle, red, black, white, or fawn. Grey is the most usual colour.

The minimum height and weight for dogs and bitches respectively is 31 ins. 120 lb., and 25 ins. 90 lb. Great size is desirable, and some hounds have exceeded 37 ins. at the shoulder. They are affectionate and faithful. Like all large breeds, they require large amounts of good food.

Irkutsk. City of the R.S.F.S.R., capital of a region of the same name. It stands on the right bank of the Angara, c. 40 m. below Lake Baikal, and on the Trans-Siberian rly. It is the supply point for the gold fields of the area, and makes gold-dredging machinery, machine tools, and plywood, and processes mica. There is a university at Irkutsk, which is the cultural centre of Eastern Siberia. Pop. (est.) 300,000.

The region lies to the W. and N. of Lake Baikal, and is drained by the upper reaches of the Angara and Lena. It is rich in gold, iron, salt, and mica, and there are large supplies of coal, lumber, and hydro-electric power. Grain and potatoes are cultivated, and some cattle are raised. There is a fishing industry centred on Olkhon Island in Lake Baikal. Area 301,900 sq. m. Pop. (est.) 1,200,000.

Irlam. Urb. dist. of Lancashire, England, on the Manchester Ship Canal, at the junction of the Irwell and the Mersey, 8 m. S.W. of Manchester. Industries are concerned with steel, engineering, soap, and margarine. Pop. (1951) 15,063.

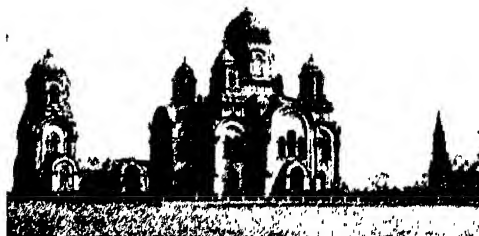
Irmín. Eponymous hero of the Hermiones, one of the three great branches of the ancient Teutonic people. He was regarded as one of the three sons of Mannus, and per-



Irish Wolfhound. A champion specimen

haps worshipped as a god. The Saxons, who were descended from the Hermiones, venerated a wooden pillar at Eresburg, in Westphalia, called the Irmínsul, or pillar of Irmín, representing the mythical world-tree which supported the universe. The pillar was destroyed by Charlemagne in 772.

Iron. Element, with the chemical symbol Fe (Lat. *ferrum*). Iron is one of the transitional elements in the first long period of the periodic table with vanadium, chromium, manganese, cobalt, and nickel. Its atomic number is 26; its atomic weight, 55.84; melting point, 1,537° C.; boiling point, 3,000° C.; specific gravity, 7.86; electrical resistivity, 9 to 15 microhms per centimeter cube; valencies, usually 2 or 3. Pure iron is a greyish-white magnetic metal.



Irkutsk. The cathedral of the Virgin of Kazan

Iron exists in two crystalline forms—alpha-iron is body-centred cubic, with lattice constant, $a = 2.861$; gamma-iron is face-centred cubic, with lattice constant, $a = 3.56$. Gamma-iron is not stable at room temperature. Transition to alpha-iron or ferrite takes place at about 920° C. If heated to over 1,400° C. gamma-iron changes to delta-iron, which is again body-centred cubic. Iron is strongly magnetic up to 769° C., at which point it loses its magnetism; this is called the Curie point.

Iron rusts rapidly in air, particularly moist air, forming a red oxide, Fe_2O_3 . This may be con-

verted to magnetic oxide, Fe_3O_4 , by the action of heat; the ferrous oxide, FeO , is also known. The metal is readily soluble in acids, producing ferrous and ferric salts, and it will combine with arsenic, phosphorus, and sulphur, giving compounds with lower melting points than the metal. It can be welded directly to itself without the intervention of a solder, and it alloys with most metals. Combined with carbon it forms the wide range of alloys called steels, which can be modified by the addition of other metals to give alloy steels.

The U.S.A., the U.K., France, Western Germany, Belgium, Luxembourg, and the republic of India are the chief countries producing pig-iron. The metal is of the first importance in industry and engineering, the study of its alloys being an important branch of science called ferrous metallurgy.

HISTORY. Iron has been known to man for many centuries, but it is still uncertain when he first used it for the manufacture of weapons and tools. It would seem to have been in Anatolia among the Hittites that iron first came into general use. The Bronze and Iron Ages overlapped considerably in many places.

Very much higher temperatures are required to melt iron than to melt copper or its alloys from their ores. Nevertheless, iron can be made without fusion, by reduction of iron oxide ore to wrought iron, at considerably lower temperatures than must be used in copper smelting. This was the method used for making iron up to the middle of the 16th century.

The comparatively simple metallurgical operations for the primitive manufacture of wrought iron are still practised, e.g. by certain peoples of Nigeria. Iron ores are, moreover, very common all over the world.

Primitive man sometimes used meteoric iron, which is the metal in its pure state, as in, for instance, beads found in a predynastic cemetery in Egypt. This may also have been the material used for certain amulets mentioned in the Book of the Dead. Iron does not seem to have been used in Egypt until the XXVth dynasty (700 B.C.).

Iron in early ages was chiefly produced as wrought or malleable iron or steel, the manufacture of steel following naturally from the use of charcoal as fuel. However, in the light of certain passages of a manuscript, preserved at Lucca, Italy, it seems certain that liquid iron was tapped from furnaces and cast in Europe at least as early as the 8th century A.D. Even more remarkable is the discovery in 1946 by Professor K. Absolen of a prehistoric cast iron 2,500 years old, found in a smithy worked in the 6th century B.C., near Brno, Czecho-Slovakia. Georg Agricola, in *De Re Metallica*, 1556, describes three processes. The first is the primitive process of producing a pasty mass of reduced ore, which was hammered to squeeze out the slag and produce "bloom." The second process involves the use of a shaft furnace, "similar to a blast furnace, but much wider and higher, so that it may hold a great quantity of ore and much charcoal." The conditions in such a furnace would be similar to those in a forge on a larger scale. If the temperature were raised, iron would be produced, similar to cast iron, and Agricola does mention this, though he probably did not fully understand it. The subsequent production of malleable iron from this hard iron is the basis of the indirect method. Agricola's third process is the manufacture of steel by cementation, "which the Greeks call *stomōma*."

First Production of Molten Iron

The Catalan forge, said to have been designed in Catalonia, Spain, is similar to the furnaces used in Britain until the 14th century for the production of wrought iron direct from the ore. The first shaft furnaces, although roughly similar in design to the modern blast furnace, were still used only for wrought iron production. It is said that molten iron was first produced by accident owing to the higher temperatures attained when shaft furnaces were increased in size. This hard, brittle iron was thought undesirable by the makers and it was not until they found that their furnace would produce nothing else that they set to work to improve the "pig," so founding the modern iron and steel industry.

Charcoal was used as fuel in Great Britain until an act of 1584 was passed to preserve the woods of Sussex, Surrey, and Kent from the depredations of the iron makers. A few years later, in

1611, James I granted a patent to Simon Sturtevant for the use of "sea coale" or "pit coale," but it was not until 1619 that Dud Dudley of Worcestershire, amid much opposition from the charcoal iron masters, first produced iron with the aid of coke, made from coal. Although the Chinese had been using coke for many years, it was not until 1735 that Abraham Darby (1711-63) of Colebrookdale Ironworks, Shropshire, first used coke in a blast furnace. In 1784 rolls were introduced by Henry Cort, whose puddling process further facilitated production of wrought iron.

Invention of Hot Blast

James Neilson invented the hot blast in 1828. His idea was to use the waste heat from the gases escaping from the top of the furnace for preheating the air blast introduced at the bottom. This opened the way for the development of blast furnaces producing as much as 1,000 tons of pig iron per day. The Bessemer process, introduced in 1856, was followed by the Siemens-Martin open hearth process, since when developments have been confined to mechanical improvements and increases in the scale and scope of operations.

RAW MATERIALS. The primary requirement for the production of pig iron, first product in the manufacture of iron and steel, is a good iron ore. Clarke showed that 4.64 p.c. by weight of the earth is iron. It is one of the four most common elements in the earth's crust, the others being oxygen, silicon, and aluminium. But for the ore to be workable, the iron must be present in such a mineralogical state and quantity that it can economically be extracted. The most important ores are haematite, Fe_2O_3 , magnetite, Fe_3O_4 , limonite, $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$, and siderite, Fe CO_3 , of which the richest is magnetite, containing 72.4 p.c. of iron. Iron probably never occurs native, except in meteorites, when it is usually associated with nickel, although claims have been made that native iron has been found in German mines and in W. Africa. Pyrites, the iron sulphide, is very common, but it is important chiefly because of its sulphur content, 53.3 p.c., which makes it suitable for the manufacture of sulphuric acid. Red haematites from the Lake Superior district and magnetites are rich sources of iron ore in the U.S.A. The U.K. mines haematite and carbonate

ores; while the bulk of the iron ores of Germany are acid deposits. Other producers are France, Spain (whence comes the famous Bilbao ore), Norway and Sweden (where there are exceptionally pure magnetic ores), Italy, China (where the iron industry is the oldest in the world), Canada, and India.

Methods of mining and handling the ore vary with the position and nature of the deposit. It is sometimes necessary to improve the ore either by increasing the metal content or by removing some objectionable material, such as sulphur or phosphorus. The methods used for beneficiation must be cheap and are usually restricted to hand-picking, drying, roasting or calcination, washing or jigging, to remove excess clay, magnetic separation, and agglomeration. The saving in cost of transport of the improved ore often pays for the beneficiation processes.

Coke as Furnace Fuel

The other raw materials needed are fuel, fluxes, and air. Coke is universally used as a blast furnace fuel, though occasionally some anthracite is added. The chemical composition, that is, the moisture, ash, sulphur, volatile contents, etc., of coke used in blast furnaces is important, but its physical properties are more so. It must be hard and resistant to abrasion or it will not withstand the immense pressures in the furnace, and it must at the same time be porous and readily combustible. Study of such factors has reduced the fuel consumption from 1 ton to 17 cwts. per ton of pig iron, with a consequent saving in cost. Coal washing has also improved the quality of the coke. Most British iron makers make their own coke on the site of the blast furnace.

Flux must be added to the furnace to help the unwanted gangue minerals in the ore and in the ash from the coke to form a readily fusible slag, which can be tapped from the furnace. Most of the impurities are acidic in their chemical nature and so a basic material is chosen as a flux, usually limestone. Limestones vary widely in composition, but the content of calcium carbonate varies from 30 to 95 p.c. and of this 56 p.c. is lime and useful for fluxing. Often some magnesia is present and, in fact, dolomite is sometimes used, a mixed magnesium, calcium carbonate. Magnesia gives a slag with a lower

melting point, however, and so is not always desirable.

Air is an important raw material, and variations in its quantity and quality can completely upset the running of a blast furnace. This is not surprising when it is considered that to produce one ton of pig iron, the materials needed are approx. 2 tons of ore, $\frac{1}{2}$ ton of flux, 1 ton of fuel, and 4 tons of air, yielding, in addition to the pig, $1\frac{1}{2}$ tons of slag and $5\frac{1}{2}$ tons of blast furnace gas. A large blast furnace might produce up to 1 ton of pig iron per min. and so, with air of normal humidity, 5 galls. of water, or more, is pumped into the furnace in the same time. The ideal would be to remove all this water, but practical difficulties have made this economically impossible. Therefore an even supply is aimed at, fluctuations causing unsteady working. The air is preheated, with a consequent increase in production and reduction in cost and fuel consumption. Neilson found that by raising the temp. of the air by 600° F. he decreased fuel consumption from 8 to 2 tons of coal per ton of iron, and temps. now used exceed 1,000° F. The preheating is carried out by a series of stoves, containing a chequer-work of refractory bricks.

Method of Forced Draught

One set of stoves is heated by burning the hot gases from the top of the furnace while the other is preheating the air: periodically the positions are reversed, so that the air is kept at a reasonably constant temperature. Natural draught would obviously be insufficient to force this amount of air into a furnace. The bellows used of old have been replaced by huge blowing engines, handling as much as 45,000 cu. ft. of air per min. at a pressure of 15 to 20 lb. per sq. in. Either gas engines or steam turbo-blowers are used for this operation.

PRODUCTION. The design and working of a blast furnace are described under that heading; many excellent examples may be seen in Great Britain, particularly in the "black country" of the Midlands. The structural design must be sound and the foundations heavy, as the furnace carries as much as 3,000 tons of material, and pressures on the hearth exceed 50 lb. per sq. in. A blast furnace takes nearly a month to start, but, once fully working, will remain so for 2, 3, or even 5 years. Its products are slag, which is crushed and used for the manufac-

ture of cement, and pig iron. From the latter are made wrought iron, cast iron, steel, alloy steels, etc. Pig iron varies in composition according to the material with which the blast furnace is charged, and this variation is controlled to produce a pig iron suitable for the purpose for which it is to be used. At one time the pig iron was cast into sand moulds, and an examination of the fracture showed the quality of the iron. In modern practice the bulk of the pig iron for steel making is never cast at all; it is carried in large ladles on a "hot metal car" direct to the open hearth or electric furnace or to the Bessemer converter. If it is to be chilled, casting machines with iron moulds which can be rapidly cooled are used. Pig iron contains 3.5 to 4 per cent of carbon with varying amounts of silicon, sulphur, phosphorus, and manganese (see table in p. 1210).

How Wrought Iron is Made

Wrought iron contains very little carbon and most of the impurities are concentrated in the slag inclusions. It is made from pig iron by a process very similar to that used by the old iron masters for making iron direct from the ore. The pig iron is melted down, the silicon oxidised, forming a slag, and is then "boiled," removing carbon as the dioxide; the iron is then "brought to nature," when small balls begin to form, and then "balled up," the balls being hammered in a mechanical hammer. After this "shingling," the "puddled bloom" is rolled and re-rolled into "merchant bars." Wrought iron is very malleable and ductile, easily welded and resistant to corrosion. By contrast, cast iron is very hard and brittle, largely because of the high carbon content, which is similar to that of pig iron, but more in the combined state as cementite, which is extremely hard. It is made by melting pig iron with limestone and coke in a cupola, which is cheap and easy to run, but is being replaced by the reverberatory furnace or electric arc furnace, both of which can be closely controlled and give a purer product. Malleable cast iron can be made by removing some of the carbon and making the remainder more finely divided and graphitic. The white heart process, favoured in Great Britain, involves packing the iron in boxes with haematite ore and heating for some days, some of the carbon being oxidised. The Americans prefer the black heart process, where a neutral packing agent is used and no

carbon is removed; it is all converted to temper carbon or graphite, and the mass cooled very slowly. The purest form of iron available commercially was evolved by an American company for the manufacture of galvanised sheet and wire. The method is similar to the open-hearth process for steel making, except that specially selected pure raw materials are used. When the metal is ready to tap, pure haematite ore is added, oxidising the impurities so that they go to the slag leaving less than 0.2 p.c. in the iron. A pure ingot iron has been made in electric furnaces and very pure iron can be made by electrolysis.

Iron. A golfer's club, a little shorter than the cleek. The face is slightly lofted, not so much as the mashie, but more than the cleek. A powerful mid-iron is a valuable club for winter use on inland courses.

Iron Age. Period in the history of human culture when iron-working became general, and iron tools and weapons replaced those of bronze and copper. In central and western Europe it covers the centuries preceding the Roman conquest. Meteoric iron was known from very early times and credited with magical properties. Iron ore was first worked in about 1400 B.C. in Anatolia, and possession of the new iron weapons was one of the reasons for Hittite power. The knowledge of iron spread thence to Mesopotamia and beyond, to Egypt, and westwards to the Aegean, where it was coming into use in Late Mycenaean times. From the Aegean it spread northwards and westwards about 1000 B.C., along the trade routes used in the Bronze Age, to Italy and central Europe. The Etruscans began the exploitation of Italian iron in the 8th century B.C., and the Iron Age of central Europe may be dated from the latter half of the 7th century B.C. The type-site of this culture is Hallstatt (*q.v.*) in Austria.

Iron tools played as important a part in technology as did iron weapons in warfare. The iron axe facilitated the clearance of forest, and iron ploughshares helped the working of the lands thus won for agriculture. From central Europe knowledge of iron-working was carried into France and the north. The use of iron reached Britain late, and cannot be dated earlier in what became England than the 5th century B.C.; in Scotland,

Ireland, and northern Europe it was later still.

Meanwhile, in the lands bordering on the northern Alps, there developed during the 5th century B.C. the next phase of the Iron Age culture, named after the site at La Tène (*q.v.*) on Lake Neuchâtel, Switzerland. It is with this culture that the characteristic Celtic art developed through contact with Greek and Italian art.

The use of iron appears in China somewhat later than in Anatolia, and may perhaps have been derived from that source. Iron tools were unknown in America before the arrival of Columbus. Consult Manuel d'Archéologie, Age du Fer, J. Déchelette, 1914; Prehistoric England, Grahame Clark, 3rd ed., 1944; The Coming of the Celts, J. M. de Navarro, in Cambridge Ancient History, vol. 6.

and rebuilt as the Crystal Palace. Two years later, wrought iron was used for the lattice girders for an exhibition building in Dublin; further examples were constructed for the Manchester fine arts exhibition of 1857. The Dublin and Manchester examples were unsatisfactory, however, and lattice girders fell into disrepute until they re-emerged as properly designed and constructed steel frameworks many years later.

The year 1856 is notable in engineering as it was then that Bessemer produced ingot iron (later known as mild steel) by conversion of blast furnace iron. At first the material was variable in quality, but the Siemens open hearth furnace process, introduced commercially at Crewe in 1868, made possible the production of a uniform and reliable metal. The ingots were rolled into various shapes, railway rails being among the first produced. Steel joists were not rolled in Great Britain until the year 1885.

In the U.S.A., the first skyscraper was erected in Chicago in 1884-85, and the transition in practice is exemplified in this building by the facts that whereas cast iron columns and wrought iron beams were used up to the sixth floor, some of the first American steel joists were used from that floor up to the tenth floor.

Fundamentally, the major structural difference between the current building and its forerunners is not in size but in the function of the walls. These are no longer load-bearing constructions, but are designed essentially for weather resistance or for internal partitioning, and they are carried at each floor level by beams which are themselves supported by columns extending down to the foundations. This has permitted considerable reductions in the weights and thicknesses of walls, with obvious economy in cost and materials. The first building of this type in Britain was begun at Stockton in 1899.

The engineering standards committee, now incorporated by royal charter as the British Standards Institution, formed in 1901, started its work with the first standardisation of structural sections in 1904; there were over 1,300 different specifications in its 1946 list. The British sections first standardised included joists from 3 ins. deep by 1½ ins. wide weighing 4 lb. per ft. (Fig. 2a) to 24 ins. by 7½ ins. weighing 100 lb. per ft. (2b). U.S.A. lists include rolled sections having

IRON AND STEEL CONSTRUCTION

W. Basil Scott, M.I.Struct.E.

The adaptation of iron and later steel to building made possible not only the skyscrapers of the U.S.A. but also the immense workshops needed for aeroplane building. Here is an account of the development of the process, and of current practice. See also Iron; Metallurgy; Steel; Welding, etc.

Isolated examples of the use of iron in building construction occurred as early as 1500 B.C. in the form of wall clamps bonding stone blocks in Babylon. General application of the metal to building in Great Britain began about 1750 when cast iron columns were substituted for timber posts in building mills. In 1801, James Watt, of steam engine fame, designed the first cast iron beams to be used in building. These beams were I-shaped, 16½ ins. deep and 14 ft. long. Their strength was approx. the same as a modern 7-in. deep mild steel joist (*see* Fig. 1a).

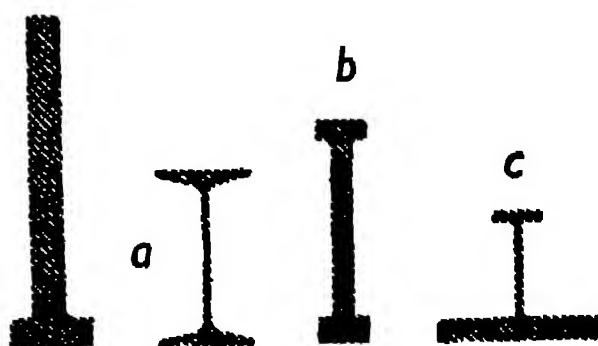
Some 20 years later, Sir William Fairbairn improved on this elementary section. His findings inspired Tredgold, who introduced the top flange in 1824 (Fig. 1b). Three years later, Hodgkinson evolved the unequally flanged section of cast iron beam which remained in general use until cast iron became obsolescent at the end of the century (Fig. 1c).

In those beams the web may be considered to resist shearing forces and the flanges as resisting the bending tendency by means of compressive forces induced in the top flange and tensile forces induced in the bottom flange. In an ordinary beam, these tensile and compressive forces are equal. The compressive strength of most cast irons varies from about 4 to about 10 times the tensile strength for the same area, and accordingly the compressive flange can be much smaller than the tensile flange; but the ratio of the areas can rarely attain the ideal value owing to other theoretical requirements, such as providing a sufficient breadth in the upper flange to prevent lateral buckling, and the practical limitations on castings which require that there should not be abrupt variations in thick-

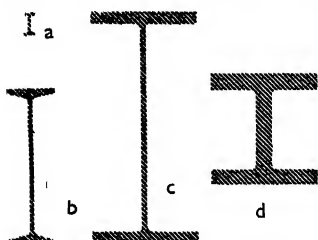
ness or long narrow projections if cracking is to be avoided during cooling.

The relatively poor tensile and impact load strength of cast iron, together with other practical limitations and the uncertainty of quality then inherent in any casting process, made cast iron an unsatisfactory material for beams. Later methods produced cast irons having tensile strengths up to 30 tons per sq. in.; but these are primarily for special purposes. The first effective substitute for cast iron was wrought iron, rolled into I-beams in France in 1849 at the instance of the French engineer, Ferdinand Zores. His beams were only 5½ ins. deep; but they introduced the rolled joist now, in mild steel, the most important element in building construction. Owing to cost, wrought iron beams never completely displaced cast iron beams; they were used chiefly for the more important members.

The fashion for exhibitions had much to do with the development of the lattice girder, the next important innovation in the history of building construction. Cast iron lattice girders used to support the galleries in the grand hall of the Hyde Park exhibition of 1851 were tested by marching soldiers over them before the public was admitted. This building was afterwards transported to Sydenham



Iron and Steel Construction. Fig. 1. a, Watt's beam and modern equivalent; b, Tredgold's beam; c, Hodgkinson's beam



Iron and Steel Construction. Fig. 2. a and b, British standard joists; c and d, American special girder and column sections

depths of up to 36 ins. (2c) and others with weights up to 426 lb. per ft. (2d). Other standardised sections are channels, angles, and tees (Fig. 3).

Where the loading is such that a simple rolled section is inadequate, then compound girders are formed by connecting plates to the flanges of rolled joists or channels, or alternatively by building a girder from an assembly of angles and plates (Fig. 4). The web plates of these angle and plate girders are almost always strengthened at bearings and at loading points by L-shaped or other stiffeners, usually disposed vertically for convenience, although inclined stiffeners have been used; horizontal stiffeners are required in very deep girders. At the other end of the scale for strength are light weight, but relatively stiff, beams assembled like lattice girders from rods or light angles. Some of these incorporate devices for attaching flooring and ceiling and are the metal equivalents of timber joisting.

Compression members are known as columns, pillars, stanchions, or struts. The first three are generally the heavier sections. In building, the main pillars are usually formed of joists with or without flange plates similar to compound girders,

or two members may be laced or battened together; while in lattice girders and in roof trusses, angles are preferred for the struts and also for the ties.

The use of welding as an alternative to rivets or bolts for uniting the component parts of the steel frame was another major development in structural engineering. Welding was adopted in Great Britain primarily as a means of eliminating the noise of riveting, but this is now recognized as the least of its merits.

The evolution of the steel frame structure necessitated new building laws and initially those varied from detailed Acts of parliament to simple by-laws. These were followed by specifications prepared by the British Standards Institution, the professional institutions and other recognized bodies, including a codes of practice committee formed under the aegis of the ministry of Works. Except in large cities having their own detailed building laws, the appropriate British standard specification is now generally accepted as a guide to the suitability of a design or of the materials used.

These developments have produced profound changes in building technique, of which the recognition and deliberate utilisation of the continuity between members is perhaps the most significant.

In older buildings, a beam rested on top of the walls in much the same manner as a tree trunk rested on opposite banks of a stream to form a primitive bridge. In neither case was the strength of the beam enhanced by the supports. Certain types of modern structure, however, have the beam more or less rigidly attached to the supporting pillars so that the one cannot bend without tending to distort the other. The resistance to distortion of the pillars is thus utilised to increase the load-bearing capacity of the beam. This is known as rigid-frame construction and is frequently associated with welding. Structures are no longer con-

sidered simply as skeletons sufficiently strong to support the imposed working loads and weather excluding surfaces; but rather as integral wholes in which steelwork and light alloys, flooring and walling materials, etc., are interdependent.

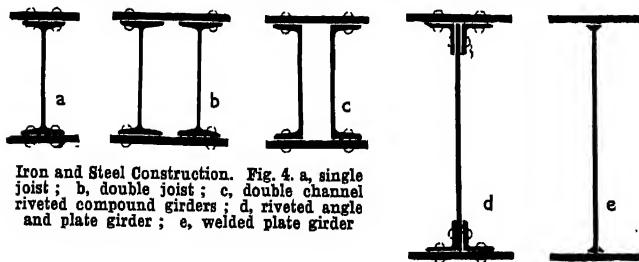
The manufacture of stronger steels permitted the engineer to design longer spans, and this in turn made possible the construction of, e.g. workshops having large areas of floor without obstructing pillars.

Some aeroplane factories have floor space 350 ft. by 400 ft. without columns yet with an overhead crane system serving the entire floor. Nor is this the limit of possibility in the size of spans.

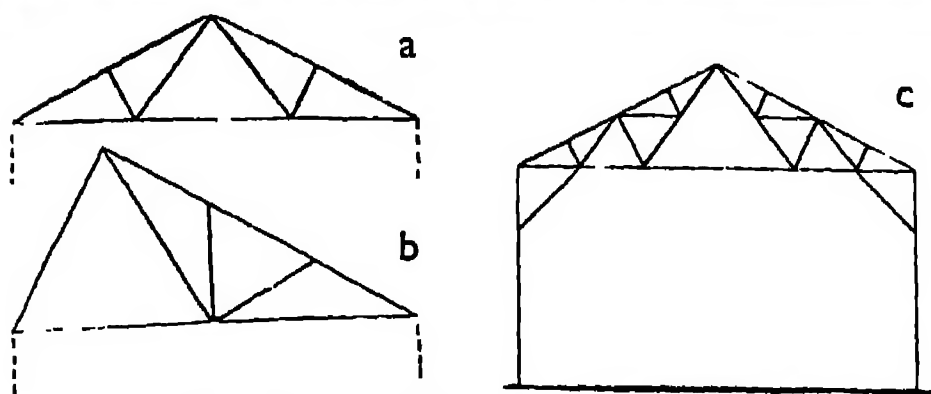
Design of rigid-frame and large span structures requires more thorough investigation by more complex methods. Theoretical data are obtained from the examination of small scale transparent models by polarised light whereby differences in stress intensity are shown as colour variations. This is associated with increased use of the actual structure as a full scale specimen for stress measurements to verify the design. Theoretical knowledge and practical experience thus develop vigorously. Yet two of the fundamental bases of current theory remain: Hooke's law relating load and deformation (announced in 1676), and Euler's column stress formula of 1774.

STRUCTURAL PRACTICE. The design of the framework starts with the roof, as the loads from this have to be supported by the various parts below it right down to the foundations. The roof may be flat or ridged or, rarely, curved. Flat roofs are generally similar to light floors; improved materials ensure watertightness. The slope of ridged roofs is governed mainly by the type of covering; an angle of about 25° is common. Types of roof truss are shown in Fig. 5. In theory, almost any type of truss can be used for any span; but in practice the type selected is usually one which limits the lengths of the individual parts of the rafter to 5-10 ft. The longitudinal spacing of trusses may be governed by the column spacing for the underlying floors; but wide variations are possible, depending on the types of purlins and covering to be used.

Where trusses are fabricated with rivets or bolts, then angles (Fig. 3, b, c) are the most popular type of section for the members, and connexions between the



Iron and Steel Construction. Fig. 4. a, single joist; b, double joist; c, double channel riveted compound girders; d, riveted angle and plate girder; e, welded plate girder



Iron and Steel Construction. Fig. 5. a, truss for short spans; b, "north-light" truss, glazing on steep slope only; c, French truss, with knee braces to supporting columns

various bars are made by attaching each bar separately to a mutual gusset plate. In welded trusses, symmetrical sections are preferred and tubes are sometimes used. The members are welded directly to each other and gusset plates are usually eliminated. (The conventional analysis of the forces in the members of a roof truss relates to frame-work having pinned joints free to rotate.)

Another type of roof, generally fabricated by welding, depends on the rigidity of its joints for its stability and thereby eliminates the cross-tie between the opposite sides at eaves level so that head-room is increased (Fig. 6). The posts and rafters in these rigid-frame roofs are frequently of joist section.

The next stage in the design is the floors. These may be of timber or of slabs, the two main types of which, though having different characteristics, are adaptable to almost any uses if suitably finished and treated. In one type, the strength is provided by light gauge pressed metal troughs to which heat and sound insulating materials suitable to the particular conditions can be added. The other type is frequently of concrete of adequate section to provide strength and having certain inherent heat and sound insulation properties due to its weight and composition. A special wearing surface is usually added to each type.

The economic span for most floors is generally considerably less than the desired spacing of columns, and so the floor is supported at suitable intervals by floor beams framing into larger beams which can be connected to the columns or to a further intermediate beam network.

deflection is limited to about one in. for spans of 25-30 ft. The strength of a steel beam depends primarily on its depth and on the

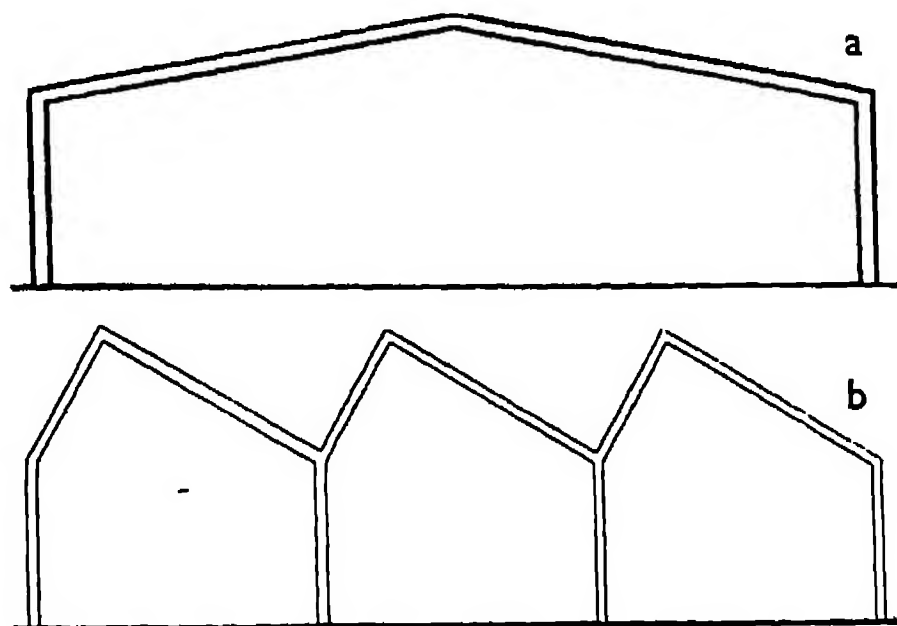


Fig. 6. a, single-span symmetrical rigid frame roof; b, multi-span "north-light" rigid frame roof

area of its flanges. These are measured by a composite term called the modulus of section which is a purely geometric function of the beam shape and takes no account of the special properties of the metal. A peculiar characteristic of a steel beam is its ability in certain circumstances to bring into operation safely a reserve of strength by diverting stress from critical points to places less fully stressed. Various methods are adopted to utilise this reserve.

The columns are placed normally at the intersections of the main beam system, and as they are obstructions to the floor they must be strictly limited in number and size. In calculating the strength of a column, allowance must be made for the effects of its length, variations in the restraint of the end connexions, deviations from straightness of the member itself, and also for any eccentric application of the loading. These considerations make formulae for column design very involved, and the engineer usually assumes a section and then checks its adequacy, instead of calculating the required

Not only must the beam used be strong enough to support the floor loads, walls, and partitions, they must also perform this task without much deflection or sagging. For ordinary purposes, the

properties and then selecting the suitable section, as for a beam.

To facilitate fabrication and erection, columns are frequently pre-constructed in two-storey lengths, and then superimposed lengths are united at the site by splice plates. Seating angles for the beams are attached in the workshop, and the lower length is provided with a suitable base to distribute the load to the foundation.

The beams and columns of riveted or bolted structures are usually connected together by short lengths of angle section, called cleats (Fig. 7). These are provided with sufficient rivets or bolts to transmit the applied loads and to retain the various members in their proper position and alignment. In welded structures, temporary cleats are often bolted to the various members to hold them in position conveniently until the strength welding is completed. The engineer may select the connexions to be practically rigid or else to have a limited degree of flexibility in a desired plane. Particularly where partially flexible types of connexions are used between beams and columns, it may be necessary to give the entire framework additional stiffness to resist wind and other horizontal loadings. This is often done by diagonal bracing in selected bays so that the frame acts like a vertical lattice girder.

Although most structures are specially designed for a particular purpose, yet certain

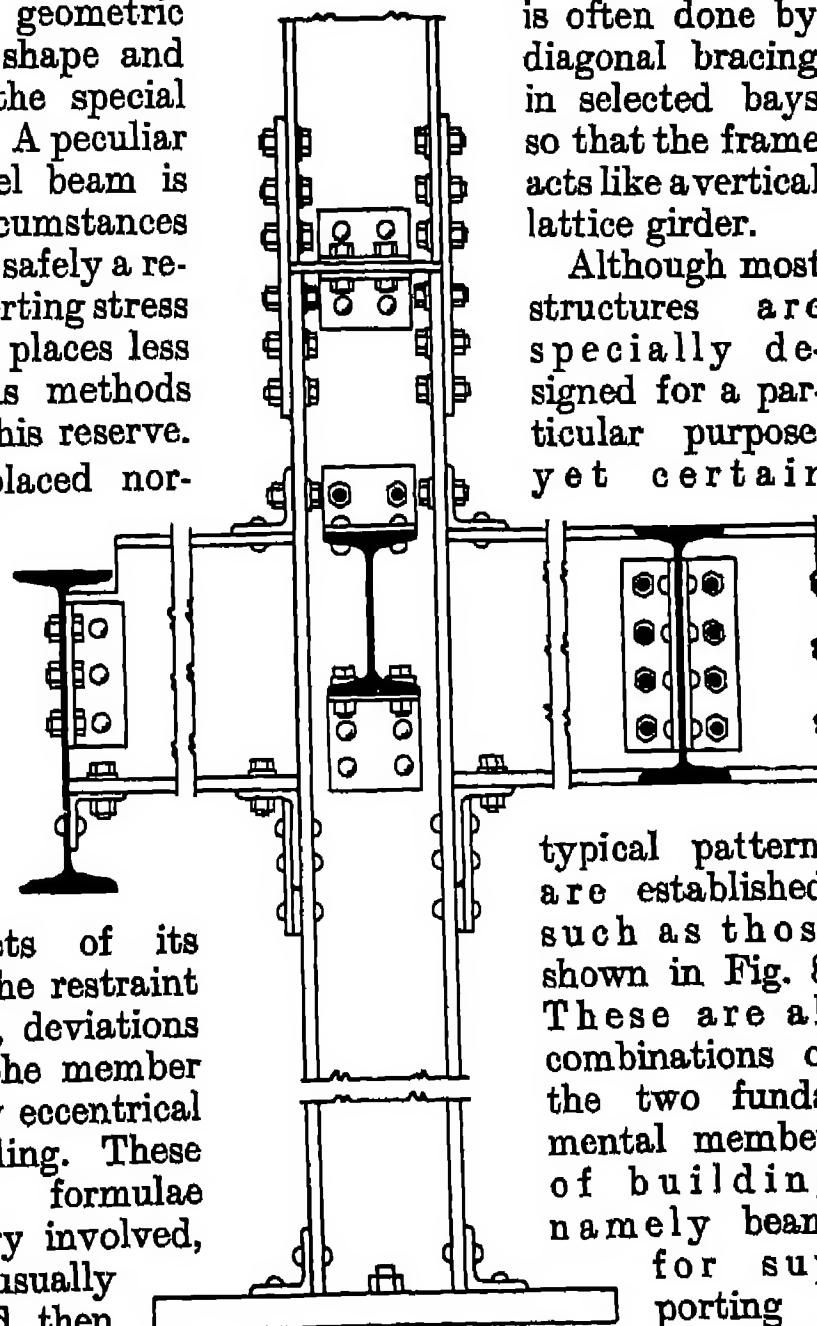
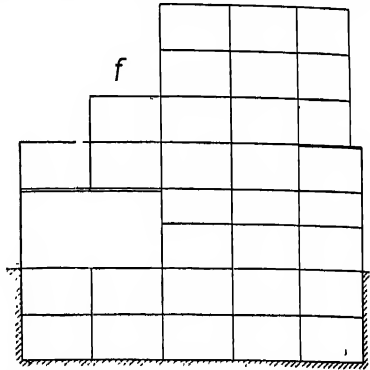
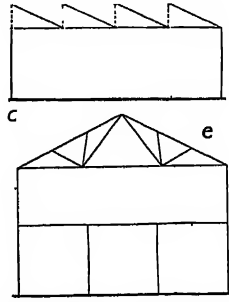
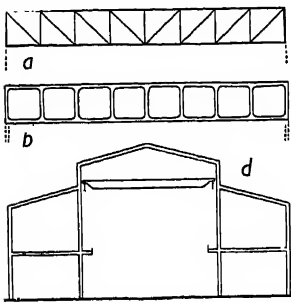


Fig. 7. Details of beam and column connexions

typical patterns are established, such as those shown in Fig. 8. These are all combinations of the two fundamental members of building, namely beams for supporting a load over an opening,



Iron and Steel Construction. Fig. 8. a, lattice girder; b, rigid joint girder; c, saw-tooth roof glazed on vertical faces; d, workshop with overhead travelling crane; e, two-storey workshop; f, multi-storey building with basements

and columns for carrying a load down to a foundation. Success results not so much from mathematical skill in evaluating the loads and stresses or mechanical dexterity in assembling the parts as from the engineer's sense of proportion and suitability of the various metals and other materials that he uses to carry the loads and make the building convenient for its job and economic for its intended life.

Iron and Steel Institute, THE. British association founded in 1889 to afford a means of communication between members of the iron and steel industries, and to arrange periodical meetings to discuss practical and scientific subjects bearing on the manufacture of iron and steel. It was incorporated by royal charter in 1899 and now numbers over 4,000 members. It awards annually a gold medal, first presented by Sir Henry Bessemer. In 1901 Andrew Carnegie founded the research fund and medal known by his name. The Williams prize is awarded annually for the best paper of a practical character. The institute maintains jointly with the Institute of Metals a valuable technical library at its headquarters, 4, Grosvenor Gardens, London, S.W.1.

Iron-bark Tree (*Siderozylum dulcificum*). Tree of the family Sapotaceae, native of W. Africa. It has leathery, alternate leaves, and small, whitish flowers in clusters. Its fruit is an oval berry, known as miraculous-berry, its intense sweetness clinging to the palate and nullifying the acidity of any other food taken shortly after. The timber is very hard. The name iron-bark is also applied in Australia to *Eucalyptus resinifera* and *E. siderophloia*, and, with a qualifying adjective, to several other species of *Eucalyptus*. See Gum.

Ironbridge. Small town in Shropshire, England. It is on the Severn, near Coalbrookdale, and with Broseley shares a railway station, 13 m. S.E. of Shrewsbury. It was named from the first large iron bridge in England, put up here across the river in 1779. *See* Bridge illus.

Ironclad. Name given to the first armoured warships. The earliest British ironclads were the *Warrior*, completed at Blackwall in 1860, and the *Black Prince*, completed at Glasgow in 1861. Both were of 9,210 tons displacement, and carried nothing heavier than an 8-inch muzzle-loading gun. In time wrought-iron armour as a protection for warships gave way to specially hardened steel plates, which, though thinner, had much greater resisting power.

Iron Cross. German military order. It was instituted in 1813 by Frederick William III as an award for bravery in battle during the war of liberation, and comprised two classes, together with a special grand cross. The last named was awarded only 10 times.



**Iron Cross, German
military order**

the first recipient being Marshal Blücher, 1815, and the last F.M. von Hindenburg, 1918. The crosses of the first and second classes consisted of an iron Maltese cross edged with silver with the royal cipher in the centre, a crown in the upper limb and the year of the award in the lower. Some 3,000,000 of the second class were awarded in the First Great War.

same, but it bore a swastika in the centre and the date 1939 on the lower limb. The order was divided into five classes, awards in all classes being made with extreme liberality.

Iron Crown. Crown of jewelled gold incorporating a thin circlet of iron, said to have been beaten out of a nail used in the Crucifixion. It was made for Agilulf, king of the Lombards, 591, by order of his queen Theodelinda, who afterwards committed it to the perpetual custody of the church at Monza, near Milan. Charlemagne was crowned with it, as were all the subsequent emperors who were also kings of Lombardy. Napoleon crowned himself with it at Milan in 1805, and in 1859 the Austrians removed it to Mantua. They restored it in 1866, when it was presented to Victor Emmanuel at Turin. *See Lombards.*

Iron Curtain. Term popularly applied to the political and economic barriers which after the Second Great War separated Soviet-controlled E. Europe from the Western democracies. The phrase was first used by Winston Churchill in the course of a speech at Westminster College, Fulton, Missouri, March 5, 1946.

by German aircraft in Scapa Flow and sank in shallow water. She was reconditioned as a fleet accommodation ship, and after the Second Great War she was sold as scrap.

Iron Gates. Name given to the narrowing of the Danube between Orsova and Turnu Severin in S.W. Rumania. It is about 2 m. long, and here are the great rapids beside an island in midstream, due to the Danube cutting through the mountain range called in the N. the Transylvanian Alps, and in the S. the Balkans. Between 1890 and 1900 a navigable way was made by blasting, over a million cubic yds. of rock being removed. Both the main road and rly. follow the left bank from the Banat to the Wallachian plain. See Danube.

Iron Guard. Fascist organization of Rumania. It was modelled on and inspired by the Nazi system, and Codreanu, its leader, was a violent anti-Semite. In the autumn of 1938 King Carol assumed dictatorial powers, and Codreanu, with a number of other leaders, was shot. After the collapse of France in June, 1940, members of the organization helped to form a new Rumanian government. On Sept. 4 Gen. Antonescu became premier, and the Iron Guard agitated for the abdication of Carol, which took place two days later. On Nov. 27 the society instituted a massacre of its opponents; but owing to internal quarrels Antonescu disbanded its police. The organization then broke into two factions. A decree of Nov., 1944, provided for the arrest of all former members of the Iron Guard.

Iron Lung. Device for applying artificial respiration when the chest muscles are too weakened by disease, as in poliomyelitis, to induce natural inhalation and exhalation. The patient is placed in a metal cylinder with the head protruding through an airtight rubber collar. By an electrically-driven compressor, air pressure inside the cylinder is changed to create an alternate partial vacuum

and pressure; this, acting on the body of the patient, causes the chest to expand and contract as in normal breathing. The number of respirations can be adjusted, varying from 15 to 35 per minute, and the usual pressure is equivalent to 4 oz. per sq. in. The first practical iron lung was constructed in 1935 by Dr. Philip Drinker, lecturer in physiology at Harvard medical school. In some hospitals, notably in the U.S.A., whole wards are built on the principle of the iron lung, the bodies of the patients



Iron Lung. Child sufferer from poliomyelitis inside an iron lung at the Isolation Hospital, Scunthorpe, in Lincolnshire

being inside the pressurised room and their heads outside.

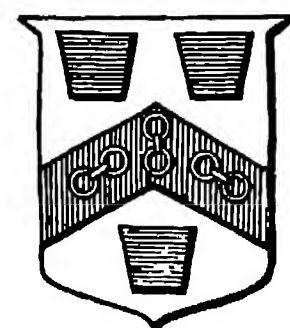
Iron Mask, THE MAN IN THE. A French state prisoner. The radical facts in this famous historical enigma are three. On Sept. 18, 1698, Saint Mars, a trusted officer of Louis XIV, brought to the Bastille in a litter a male prisoner, whose face was hidden by a mask. Five years later, Nov. 19, 1703, the prisoner died in the Bastille. At dusk next afternoon he was buried in the churchyard of S. Paul, just outside the prison. The official entries of his reception in the Bastille, his death and interment, the sole incontestable documents in the case, are extant. This is the brief story of the masked man whose identity has intrigued the world. The mask, described sometimes as of iron, seems actually to have been of black velvet.

Voltaire bewitched his generation with a legend, afterwards wonderfully embellished by Dumas in *Le Vicomte de Bragelonne*, that the unknown prisoner was an

illegitimate son of Anne of Austria, a brother, therefore, of Louis XIV himself. Other hypotheses have been advanced, setting up claims for Vermandois, Buckingham, Monmouth, the duc de Beaufort, Fouquet, a son of Cromwell, a son of Charles II, even Molière. In *L'Homme au Masque de Fer*, 1870, Marius Topin, in succession to Heiss, Roux-Fazillac, and Delort, pronounced definitely for Count Ercole Mattioli, secretary of state to the duke of Mantua. Mantua's revenues being usually pledged to the Jews, Louis XIV conceived the notion of buying from him for hard cash the fortified town of Casale, on the high road to Milan. Negotiations lay with Mattioli, who for a double bribe betrayed both his master and Louis XIV. The king, furious, had him kidnapped, May 2, 1679. Mattioli was carried to the fortress of Pignerol, and here in the Île Sainte Marguerite and in the Bastille successively he was for 24 years in captivity.

In 1898 Funck-Brentano, in *Légendes et Archives de la Bastille*, clinched it by printing facsimiles of the two Bastille records. These taken together show inferentially that Mattioli was the masked prisoner in Saint Mars' keeping. Certainly no other name of a claimant to the mask is within measure of satisfying the demands of the two essential documents. For the employment of the mask there seems no royal warrant, and Funck-Brentano suggests that its voluntary adoption by the prisoner himself would afford relief to him in his captivity. Before his death Mattioli had apparently dropped out of account among the inmates of the Bastille, and shared a room with others, forgotten by the sovereign whose vengeance had exhausted itself. Lord Acton, the historian, declared that Mattioli was the man in the iron mask.

Ironmongers' Company. The tenth of the twelve chief London city livery companies. Formed c.



Ironmongers' Company arms

1300, its arms were granted in 1455, by laws framed in 1455, and the first of its six charters granted in 1463. The name of Ironmonger Lane, S. from Gresham Street to Cheapside, commemorates the part of the city in which the craft

centred before moving to Thames Street. The first hall was in Fenchurch Street, E.C., the site of which was acquired in 1457; it was rebuilt in 1587 and in 1748-52. Escaping serious damage by the fire of 1666, it was used for service in 1673 by the parishioners of All Hallows, Staining; and the Turkey Company held meetings here in the 18th century. The interior was remodelled in 1847. In 1917 the hall was destroyed by German aircraft. The new hall in Aldersgate St. was put up in 1922-25 on the site of an Inigo Jones residence known as Thanet House, later as Shaftesbury House. It was damaged in the Second Great War.

Ironmould. Name given to the red stains resulting from the contact of iron, in soluble form, with linen or cotton fabrics. Ink, a solution of iron tannate or gallate, is one of the chief causes of ironmould on linen, the iron being converted into ferric oxide in the process of washing the fabric. Oxalic acid or an acid oxalate, such as the so-called salts of lemon, removes the stains by combining with the ferric oxide to form an iron salt soluble in water.

Iron Mountain. City of Michigan, U.S.A., and co. seat of Dickinson co. On the Upper Peninsula, near the boundary with Wisconsin, it is served by rlys and is a trading centre of the Menominee Range area. Iron ore was mined from 1878, when rich deposits of haematite were discovered, until the 1930s. In the suburb of Kingsford, the Ford Motor company maintains extensive plant, including the world's largest establishment of drying kilns. Iron Mountain was chartered 1887. Pop. (1950) 9,679.

Iron Ores. Of the many iron-bearing minerals, only four are important ore minerals. These are magnetite (72 p.c. iron); haematite (70 p.c.); limonite and goethite, hydrated yellow-brown oxides (60 p.c.); and siderite, sometimes known as chalybite or spathic iron ore (48 p.c.). Some siderite ores contain greenish hydrous iron silicates, chamosite and greenalite, e.g. in the Midlands and in parts of France. These ores never contain the theoretical percentages of iron given above. Quartz, clay, limestone, manganese, titanium, sulphur, phosphorus, and arsenic are common impurities; manganese and titanium may be desirable constituents, but the last three must be removed.

The huge magnetite deposits at Kiruna and Gellivare, Sweden, are

the most famous of their kind. An enormous sheet of magnetite outcrops on the crest of a hill and is worked by quarrying; the estimated ore reserve is over 1,000 million tons. It probably originated as a result of magmatic differentiation in depth. It could not be worked until the Thomas process eliminated the phosphorus content. Sometimes sedimentary ores have been converted into magnetite by metamorphic processes.

Haematite ore bodies occur in Cumberland, around Lake Superior, at Krivoi Rog (Ukraine), and Bilbao (Spain). The former are considered to be replacements of limestone by haematite derived from overlying ferruginous sediments. The Lake Superior deposits may have a sedimentary origin. The hydrated oxide ore bodies are generally formed by sedimentary processes. Large deposits occur in Alsace-Lorraine, where the ore is oolitic.

Among siderite (iron carbonate) ores, impure nodules and bands in the Coal Measures are known as clay-ironstone and blackband ironstone. Jurassic oolitic iron ores stretch from Yorkshire to Northants. Similar deposits occur in Newfoundland.

Ironsides, WILLIAM EDMUND IRONSIDE, 1ST BARON (b. 1880). British soldier, born May 6, 1880, son of Surg.-Maj. William Ironside, Aberdeenshire, educated at Tonbridge and the R.M.A., Woolwich, he entered the Royal Artillery in 1899. In the First



Lord Ironside,
British soldier

Great War he was mostly a staff officer, commanded Allied troops at Archangel, 1918-19, and was knighted. Promoted major-general, he was commandant of the staff college, Camberley, 1922-26; Q.M.G. in India, 1933-36; then G.O.C.-in-C. Eastern Command. At the outbreak of the Second Great War, Ironside was c.-in-c. Gibraltar, but returned to the U.K. to be chief of the imperial general staff. From May to July, 1940, he was commanding home forces. The small bodies of mobile and strongly armed troops organized at that time for local defence were named Ironsides after him and in allusion to Cromwell's soldiers. Promoted field marshal, he was made a peer in 1941.

Ironsides. Name given to the troopers of Oliver Cromwell. Rupert is said to have described Cromwell himself as an Ironside, possibly with sarcastic reference to his body armour, and about 1648 the term was applied to Cromwell's troopers in recognition of their excellent discipline. Earlier, Edmund, the rival of Canute, had been surnamed Ironside.

Ironstone. The name given in Australia to the iron-rich oxidised outcrop of certain mineral veins. See Gossan.

Ironwood. General term applied to a large number of distinct trees whose timber is hard and heavy. Almost every country has an ironwood tree, but in each the name is applied to a species distinct botanically, and even in one country it may indicate several different species, e.g. in New South Wales, where ironwood indicates *Olea paniculata*, *Turritia argyrodendron*, or *T. actinophylla* indifferently.

Ironwood. City of Michigan, U.S.A., in Gogebic co. On the Upper Peninsula, on the Montreal river, opposite Hurley, Wis., it is served by the Chicago and N.W. rly. It has iron ore mining and lumbering enterprises; over 100,000,000 tons of high grade ore have been shipped from the district in 50 years. Bessemer steel is also made. Ironwood was settled in 1885 and chartered as a city in 1889. Pop. (1950) 11,466.

Irony (Gr. *eirōneia*, dissimulation). In rhetoric a method of speech by which the words used convey a meaning the reverse of that which is really intended. It is a form of ridicule exposing errors or faults by seeming to adopt or approve them, and, employed by a master, is a deadly weapon. Pascal's Provincial Letters is an admirable example of delicate irony. Swift was a master of savage irony. Socratic irony is the method of teaching adopted by Socrates. He pretended ignorance, seeming to solicit information, and then suddenly confronted his opponent with some unexpected consequence deduced by the string of questions. Tragic irony is the name given to a device used in Greek tragedy, notably by Sophocles, whereby a character's words and action are wholly contradictory to the actual situation as known to the audience.

Iroquois. Confederacy of North American Indian tribes, once occupying part of New York state. During the 16th century the Mohawks, Cayugas, Oneidas,



Iroquois. Left, chief, Quebec province. Right, squaw

Onondagas, and Senecas formed the so-called Five Nations; the incorporation (1715) of the Tuscaroras resulted in the Six Nations group. Perhaps of ultimate Algonquian derivation, they spoke dialects of the Iroquoian family, which originated along the St. Lawrence river, and included Cherokees and Hurons. They attained the highest Amerind social organization, with chiefs and sub-chiefs, chosen in tribal councils dominated by the matriarchy. Maize culture was their staple industry; the chase was secondary. In Canada they number now a few thousands; in the U.S.A. perhaps 50,000, including Cherokees. Like other American Indian tribes, the Iroquois are nominally slightly increasing in number; but the proportion among them of pure-blooded Iroquois is decreasing. *Pron.* Irro-kwoy.

Irradiation. Term sometimes inaccurately applied to the use of X-rays in medicine, the correct term for which is radiotherapy (see Radium; X-rays).

Treatment of foodstuffs (both human and animal) by irradiation, to increase the vitamin D content, was practised during the 1920s and 1930s, but fell into disuse after the Second Great War, vitamin D being, where necessary, added directly to the diet.

Irrational Numbers. These are algebraic numbers which cannot be expressed as the quotient of two integers, though the term is sometimes taken to include also transcendentals (see Number). Already in the 5th century B.C., the Pythagorean school of Greek philosophers had discovered that the length of the diagonal of a square was incommensurable with the side, i.e. that $\sqrt{2}$ could not be expressed as an exact fraction. This discovery appeared to con-

tradict their basic belief that numbers represented the ultimate reality, and they are said to have been so disturbed that they tried at first to keep it secret. At any rate, it may well have been one of the reasons that made Greek mathematicians concentrate so single-mindedly on the kind of synthetic geometry represented by Euclid, this delaying the discovery of analytical geometry for nearly 2,000 years.

By the time of the Renaissance, irrationals (or surds) were in common use, and much of the practical difficulty in handling them had been overcome by the invention of decimals. It was then possible (though laborious) to find the value of $\sqrt{2}$, for instance, to any degree of accuracy, by continuing the arithmetical operations for extracting the square root of 2.000... until the required number of decimal places had been reached. An irrational expressed as a decimal fraction does not terminate; but no repeating pattern ever appears in the succession of figures. All repeating decimals represent rational quantities, and all rationals can be expressed as repeating decimals (for example, $\frac{1}{4} = 0.249$; $\frac{1}{14} = 0.07142857$).

The theoretical difficulty about irrationals (which also applies to transcendentals) is simply one aspect of the difficulty involved in the concept of continuity and is closely connected with the problems of infinity. If all the rational numbers are taken to be represented in order by points on a line AB, it can be shown that these points are dense on the line, in the sense that between any two such points, however close together, it is always possible to find at least one other point (and in fact an infinite number of such points). There would therefore appear to be no room on the line for points representing irrationals or transcendentals. J. W. R. Dedekind solved the difficulty by imagining the line cut into two parts (Dedekind section). For a given irrational, say $\sqrt{2}$, the cut is made in such a way that all the points to the left of it represent numbers whose square is less than 2, while all the points to the right represent numbers whose square is greater than 2. Thus $\sqrt{2}$ may be taken as "occupying the gap" between the two sets of rational numbers. Or more generally, suppose all the rational numbers divided into two classes *L* and *R* in such a way that all members of *L* are less than all

members of *R*. If there is no member of *L* greater than all the others, and no member of *R* less than all the others, the cut represents an irrational.

Irrawaddy. A variant spelling of the name of the river of S.E. Asia, also spelled Irawadi (*q.v.*).

Irredentism. Movement in Italy aiming at the deliverance of all Italian-speaking lands from foreign rule. Its rallying cry was *Italia irredenta*—Italy unredeemed—and it came into existence after the formation of the kingdom of Italy, 1861. Its chief demands were for the cession by Austria-Hungary of the Trentino, Trieste, and other Italian-speaking areas remaining under her rule; but the movement also sought to secure Malta from Great Britain, Corsica and Nice (Nizza) from France. The movement lost much of its strength after the conclusion of the triple alliance, 1882. Many of the irredentist demands were conceded by the treaty of St. Germain, 1919, which even gave Italy German-speaking areas of Tirol. Irredentist feeling was reanimated by the fascist regime, with its renewed demand for Nice and Corsica; and the continuing Italo-Yugoslav frontier antagonism kept it alive after the Second Great War.

Irregulars. Troops raised in war for temporary service in particular localities on special terms. Such were the Croats who served under General Loudon in the Seven Years' War; the *francs-tireurs* in the Franco-Prussian War; T. E. Lawrence's Arabs who drove the Turks from the Hejaz and Transjordan in 1917-18; the Ethiopian patriot troops organized by the British in 1940-41; and the French resistance and other European underground movements of the Second Great War. See also Guerrilla; Maquis; Resistance Movement.

Irrigation (Lat. *irrigare*, to water). A method of supplying water to land in order to increase its productivity. In India and the U.S.A. vast areas of land, hitherto worthless, have been put to useful account, while Egypt depends almost entirely upon irrigation.

The water used for irrigation is obtained from either rivers or wells. As the normal level of a river is below that of the lands to be irrigated, it is usual to construct a barrage or weir across the bed and raise the level of the river sufficiently to direct part of its flow into canals having intakes above the weir. Surplus flood water

passes over the crest of the structure or through sluices. Automatic shutters and gates keep the level approximately constant.

To make fuller use of a river, the annual discharge must be regulated by a dam built in an appropriate location. In the flood season immense quantities of water are impounded behind the dam for consumption during periods of smaller natural flow. The most important irrigation schemes of the U.S.A., India, and Australia are based upon the formation of huge reservoirs, and the irrigation of the Nile valley has been greatly extended by the controlling influence of the large dam at Assuan.

The simplest form of irrigation is inundation, which occurs naturally on the banks of the Nile, and may be produced artificially if a river is headed up by a temporary obstruction. The land is divided into sections by low banks which trap the water. As the level of the river falls, the water drains away, leaving behind a deposit of fertilising silt. Where perennial irrigation is required an elaborate system of main canals, subsidiary canals, feeders, and ditches, successively multiplying in number while decreasing in size, becomes necessary. In a gravity scheme the main canals follow a contour along the upper edge of the district to be irrigated, and at intervals throw off branches which subdivide the area and feed a number of main ditches. These ditches deliver to distributaries running down the slope through the fields, and the distributaries in turn supply minor ditches or basins laid out across the slope. The method of application varies with the character of the crop. Fodder crops are watered by allowing the liquid to flow over the ground in a thin sheet, whereas root crops and orchards are better served by admitting water to furrows between the rows until the intervening earth is saturated. In the Carolinas many plantations are irrigated by a system of underground tile flues. When these are stopped up at the lower end the water is forced up through the earth as needed, and any surplus drains away when the plugs are withdrawn.

Rice requires to stand in water during the period of growth. Other crops are damaged by overwatering, so, especially where water is scarce, the irrigator uses the minimum needed. To prevent waste, the supply canals and ditches are in some districts not made self-discharging, and the irrigator has

to raise what water he requires to a level from which it will flow over his land. Most irrigation schemes are maintained by the taxation of land supplied, the charge per unit of area varying with the nature and profitability of the crop.

Irritability (Lat. *irritare*, to cause to snarl). In physiology, this denotes sensitiveness to stimuli or external influences as shown by alterations or movements in the living tissues. This tendency is strikingly exhibited by several plants. Thus, the stamens of the barberry and of kalmia, when touched by an insect, rise up with a jerk and strike it, dusting the disturber with pollen.

The bilobed stigma of mimulus, martynia, goldfussia, etc., on being touched close their lobes face to face. The irritability of the sensitive plant (*Mimosa pudica*) has long been known. A slight concussion causes all the leaf-stalks to bend down, while the leaflets turn forwards and upwards and fold up.

In some plants the seed vessel is very irritable. If a seeding plant of *Cardamine impatiens* be touched, a volley of seeds strikes the face of the disturber. Much the same happens if the seed vessel of the woodsorrel (*Oxalis*) be touched.

Irthing. River of N. England. Rising among the hills on the Northumberland and Cumberland borders, it flows for several miles between these counties, and then S.W. through Cumberland to the Eden, which it joins near Warwick, 4 m. E. of Carlisle, after a course of 30 m. The lower valley forms the western end of the Tyne Gap across the Pennines.

Irtysh. A river in Russian Central Asia. It rises in the Chinese Altai, flows N.W. through Lake Saisan, crosses the N.E. of Kazakh S.S.R., and falls into the Ob at Samarovsk after a course of 2,300 m. When free from ice the river is a valuable means of communication, and two branch rlys. terminate on its upper course. The chief towns on its banks are Tobolsk, Omsk, and Scimpalatsinsk. Above Tobolsk formerly stood Sibir, the capital of a Tartar khanate, captured by the Cossack Yermak (16th century). This gave its name to the whole country.

Iruia (Tamil, dark). Primitive tribe found in the state of Madras, S. India, in the area bordering on Kerala and Mysore. They number some 100,000. The majority have become Hinduised. Their aboriginal characteristics are best preserved in the Nilgiri hills. Dark-

skinned and broad-nosed, and of short stature, they are Dravidians and speak a Tamil dialect. Many now labour on coffee plantations. They worship Rangaswami, a form of Vishnu.

Irún. Town of Spain, in the province of Guipúzcoa. Standing on the Bidassoa, 10 m. by rly. E. of San Sebastian, and 1 m. W. of Hendaye in France, it is the chief custom house for trade between Spain and the rest of the Continent. It is a rly junction, and has ironworks and paper mills. There are an old church and a handsome town hall, and near by are thermal springs. Irún was one of the first towns to fall, Aug., 1936, to Gen. Franco's forces in the Civil War. Pop. (1950) 19,956.

Irvine. Royal burgh and seaport of Ayrshire, Scotland. It stands 26 m. S.W. of Glasgow, at the mouth of the r. Irvine, 30 m. long, which rises near Drumclog on the Lanarkshire border. The burgh makes hosiery, aircraft, and bottles, and has engineering works. The parish church was rebuilt in 1774. Irvine was made a burgh in the 13th century. It was the birthplace of John Galt, novelist, and James Montgomery, poet; Burns lived here for some time. Market day, Mon. Pop. (1951) 14,745.

Irvine, ANDREW C. (1902-24). A British mountaineer. Youngest member of the Mt. Everest expedition of 1924, he was chosen by George Mallory to accompany him on the second and final attempt to reach the summit, June 8, 1924. Both perished in the exceptionally courageous attempt, and it is uncertain whether the summit was reached. *See* Everest.

Irving, EDWARD (1792-1834). Scottish divine. Born at Annan, Aug. 4, 1792, and educated at Edinburgh university, he became a schoolmaster at Haddington, where Jane Welsh, afterwards Mrs. Carlyle, was one of his pupils. He and Carlyle were rival schoolmasters at Kirkcaldy. He was licensed to preach in 1815, and in 1819 was assistant to Chalmers at S. John's, Glasgow. In 1822 he became chaplain at the Caledonian Asylum's chapel in Hatton Garden, London. His congregation removed to a new building in Regent Square in 1824. In 1832, charged with heresy, he left them and associated himself with the Catholic Apostolic Church. An appeal against his dismissal failing in 1833, his health gave way, and he died of consumption, Dec. 7, 1834. Irving wrote and preached

mainly on the prophecies, the imminent Second Advent, and the Incarnation. Carlyle paid several noteworthy tributes to his memory. *Consult Works*, ed. G. Carlyle, 1864-65; *Life*, M. O. W. Oliphant, 3rd ed. 1865.

Irving, SIR HENRY (1838-1905). British actor-manager. Son of a small shopkeeper of yeoman



Henry Irving

stock, John Henry Brodribb, to give him his original name, was born at Keinton Mandeville, Somerset, Feb. 6, 1838, and attended Dr. Pinches's school in Lombard Street, London. At 14 he became a clerk to East India merchants. Four years later he was engaged for the stock company at the Lyceum, Sunderland. He played for two years under R. H. Wyndham at Edinburgh; then in 1860 joined Charles Calvert at Manchester, where, at the Theatre Royal and the new Prince's Theatre, he remained nearly five years. The part that brought him to London was Rawdon Scudamore, the villain in Boucicault's *Hunted Down* (St. James's, 1866).

From Dec., 1867, until March, 1869, Irving was at the new Queen's Theatre, where he first met Ellen Terry, appearing as Petruchio to her Katharina. Leading man at the Lyceum as Mathias in *The Bells*, an English version of Erckmann-Chatrian's *Le Juif Polonais*, produced Nov. 25, 1871, he at length achieved fame. He added steadily to his reputation by performances as Hamlet, Macbeth, and Richard the Third.

On Dec. 30, 1878, Irving began his own management of the Lyceum, playing Hamlet to the Ophelia of Ellen Terry, who thus began a famous connexion of 24 years with him. Next year they first acted as Shylock and Portia.

Irving remained at the Lyceum, producing Shakespearian plays, staging poetical and romantic dramas, but putting on no work from a representative modern British dramatist. His greatest popular and financial success was won in Wills's version of Goethe's *Faust*, 1885; his greatest artistic triumph in Tennyson's *Becket*, 1893. His final appearances at the Lyceum, 1902, were in *Faust* and in *The Merchant of Venice*. At Drury Lane, April 29, 1905, he revived *Becket* and was received with tumultuous applause. He went on tour with the piece, but on Oct. 13 collapsed on reaching his hotel at Bradford, and died. His cremated remains were buried in Westminster Abbey, Oct. 20.

Irving married in 1869 Florence, daughter of Daniel O'Callaghan, surgeon-general in the East India Company's service, by whom he had two sons, each noted below. Irving was knighted in 1895, the first actor so honoured.

Though he essayed most of the greater Shakespearian rôles, and within the limits of his personality had a wider range than any English-speaking actor of his period; though, too, his features possessed a beauty and a refinement which were accentuated by the passage of years, Irving had neither the physical nor the temperamental equipment of the great tragic actor. In characters of pure tragedy, like *Romeo*, *Othello*, and *King Lear* he failed completely. His most effective Shakespearian rôles, in fact, were *Benedick*, *Malvolio*, and *Shylock*, tragi-comic parts in which he had to speak prose and could indulge his mordant and rather saturnine humour. As villain, expressing brutality, malignity, contempt, fear, and horror, he was in his element; witness his *Dubosc*, *Peter the Great*,

Richard the Third, *Macbeth*, *Robespierre*, *Mathias*, and *Louis XI*; while in almost static characters of pure pathos and significant silences, of a desperate dignity and nobility, such as *Becket*, *Wolsey*, *Charles the First*, *Dr. Primrose*, he had no equal.

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Irving, HENRY BRODRIBB (1870-1919). British actor. Elder son of Sir Henry, he was born in London,



H. B. Irving,
British actor
Elliott & Fry

Aug. 5, 1870, and educated at Marlborough and New College, Oxford. He became a member of Comyns Carr's company at the Comedy in 1894, and was with George Alexander,

1896-1900. His later successes included the title rôle in *The Admirable Crichton* at the Duke of York's, 1902, and *Hamlet* at the Adelphi, 1904. He visited the U.S.A. in 1906, was manager of the Shaftesbury in 1908, and lessee of the Savoy from 1913. A student of criminology, he wrote a *Life of Lord Jeffreys*, 1898; *French Criminals of the 19th Century*, 1901; *The Trial of Mrs. Maybrick*, 1913. His wife was Dorothea Baird. He died Oct. 17, 1919.

Irving, LAURENCE SYDNEY BRODRIBB (1871-1914). British actor. Second son of Sir Henry, he supported his father in many plays, and wrote for him *Peter the Great*, Lyceum, 1898. He first made his mark as Hjalmar Ekdal in Ibsen's *Wild Duck*, Royalty, 1894. His best impersonations



Laurence Irving,
British actor
Langfier

were his anarchist student in *The Unwritten Law*; his tyrannical father in *The Lily*; and his Japanese patriot in *Typhoon*, 1913. He and his wife, Mabel Hackney, were drowned when the *Empress of Ireland* foundered, May 29, 1914.



Henry Irving as Mathias in *The Bells*, a Lyceum melodrama

Irving, WASHINGTON (1783-1859). American author. He was born in New York, April 3, 1783, of Anglo-Scottish parentage, and owing to delicate health in childhood had a fragmentary education, spending much time exploring the Hudson and the Catskills.



Washington Irving,
American author

In 1802 he contributed to his elder brother's paper, *The Morning Chronicle*, a series of letters signed Jonathan Oldstyle, in the manner of Addison and Steele. During 1804-06 he was in Europe in quest of health. In 1809 he issued his first book, *Diedrich Knickerbocker's History of New York*, a good-humoured burlesque of the old Dutch settlers of New Amsterdam, Manhattan Island.

He served as military secretary to the governor of New York during the war of 1812, and was in Europe, 1815-22, when he visited Scott at Abbotsford. In 1819-20 appeared *The Sketch-Book of Geoffrey Crayon, Gent.*, which, in addition to sketches of English life, contained *The Legend of Sleepy Hollow* and *Rip Van Winkle*. *Bracebridge Hall*, a further study of English life, followed in 1822, and *The Tales of a Traveller* in 1824.

A visit to Madrid in 1826 awakened Irving's interest in the romantic past of Spain. *The Life and Voyages of Columbus*, *Chronicle of the Conquest of Granada*, *Voyages and Discoveries of the Companions of Columbus*, and *The Alhambra* appeared during 1828-32, while for part of this period he was secretary of the U.S. legation in London. Returning to America in 1832, he wrote his *Tour on the Prairies*, *Abbotsford*, and *Newstead Abbey*, and *Legends of the Conquest of Spain*, 1835. During 1843-46 he was minister to Spain. *A Life of Goldsmith* was issued in 1849; *Mahomet and His Successors*, 1850; *Life of Washington*, 1855-59. Irving died at Sunnyside, near Tarrytown, N.Y., Nov. 28, 1859, his burial place overlooking Sleepy Hollow.

Irving's work, fresh, original, whimsically humorous, gently ironical, was concerned with the romantic past. He helped to develop the essay and short story, and the spirit of his *Sketch-Book* is a permanent influence in Anglo-American relations. *Consult Works* in Knickerbocker edition; *Life*

and *Letters*, P. M. Irving (nephew), 3 vols., 1909; *Life*, S. T. Williams, 2 vols., 1936; *The World of W.I.*, Van Wyck Brooks, 1944.

Irvington. Town of New Jersey, U.S.A., in Essex co. It adjoins Newark on the S.W., and is served by the Lehigh Valley rly. Chiefly a residential suburb of Newark and New York, it has smelting works, chemical plants, and makes machine tools and cutlery. Called Camptown until 1852, it was renamed in honour of Washington Irving. Pop. (1950) 59,201.

Irwell. River of Lancashire, England. Rising on the E. side of Rossendale Forest, a few miles from Burnley, it flows S. to Manchester and then S.W. to the Mersey. Its lower course forms part of the Manchester Ship Canal (*q.v.*). Its length is about 30 m.

Irwin, LORD. Title borne by the 1st earl of Halifax (*q.v.*) when he was viceroy of India from 1925.

Isaac. One of the Hebrew patriarchs, the only son of Abraham (*q.v.*) by his wife Sarai, and the inheritor of the promises made by God to his father (Gen. 21, 22, 24, 27, 35). A prosperous farmer and stock-keeper in Palestine, he is said to have been forty years old when he married Rebekah, and his sons Jacob and Esau were not born till twenty years later. Isaac is the first patriarch mentioned as sowing seeds, and was also notable as a well digger. He is said to have died at the age of 180, and was buried with his father at Machpelah.

Isaac I Comnenus (d. 1061). East Roman emperor, 1057-59, first imperial representative of the Comnenus family. He led a conspiracy by which he supplanted Michael VI, and during his brief reign, which ended with his retirement to a monastery, did his utmost to set the finances in order.

Isaac II Angelus (d. 1204). East Roman emperor, 1185-95 and 1203-04. Belonging to a noble Greek family of Asia Minor, he was proclaimed emperor in place of Andronicus I. Distrusting the Crusaders under Frederick Barbarossa (the third Crusade), he persistently maintained a hostile attitude towards them, and formed an alliance with Saladin. The Bulgarians took up arms, and after two severe defeats—at Beroea (1190) and Arcadiopolis (1194)—Isaac was blinded and imprisoned by his brother Alexius, April 10, 1195. On the entry of the Latins into Constantinople, he was taken from prison and again set on the throne with his son Alexius,

July 18, 1203, but early in 1204 they were overthrown. Alexius was strangled, and Isaac died of fright.

Isaacs, GEORGE ALFRED (b. 1883). British politician, born in London. He was Labour M.P. for Gravesend, 1923-24; for N. Southwark, 1929-31 and 1939-50; for Southwark from 1950. Secretary of the National Society of Operative Printers and Assistants, he had been mayor of Southwark, 1919-21. Made P.C. 1945, he was minister of Labour 1945-51. A life by G. Eastwood appeared 1952.

Isabella. Feminine Christian name. A French variant of Elizabeth, its Hebrew meaning is God hath sworn. Isabel and Isabeau are forms of it; also Isobel. It has been popular among royalties, notable bearers being the queens of Spain and the wife of Edward II. King John married Isabella, a daughter of the count of Angoulême, a member of the royal house of France, and they had a daughter Isabella (1214-41) who became the wife of the emperor Frederick II. Charles VI, king of France, married the lady who is known as Isabeau of Bavaria, and their daughter Isabella (1389-1419) became the child wife of Richard II. Philip Augustus of France married Isabella of Hainault, and Edward III had a daughter Isabella (1332-79).

Isabella (c. 1292-1358). Queen of Edward II of England. Daughter of Philip IV, the Fair, king of France, she was betrothed to Edward in 1303, and married to him five years later, Jan., 1308. Edward neglected his wife from the beginning, and about 1324 she became practically a prisoner. She made her way to France, however, where, with her lover, Mortimer, she planned an invasion of England. Landing at Harwich in 1326, she captured her husband and Despensers, returned to London and proclaimed Edward III as king. Causing her husband to be murdered at Berkeley Castle, she and Mortimer held the regency until 1330, when Edward III seized both and sent his mother into retirement at Castle Rising, Norfolk. She died at Hertford, Aug. 23, 1358.

Isabella I (1451-1504). Queen of Castile. Daughter of John II of Castile and Leon, and a descendant of John of Gaunt, she was born at Madrigal, April 22, 1451. She married Ferdinand of Aragon in 1469, and in 1474, with her husband, ascended the throne of Castile and Leon. Five years later Ferdinand succeeded to the

throne of Aragon, and thus the greater part of Spain was united under one monarchy. Isabella died Nov. 26, 1504. See Ferdinand V; Spain: History.

Isabella II (1830-1904). Queen of Spain. Born at Madrid, Oct. 10, 1830, the daughter of Ferdinand VII, she benefited by a decree which set aside the Salic law, and at the age of three succeeded her father under the regency of her mother, Maria Christina. This brought into the field a claimant in the person of her uncle, Don Carlos, who for the next seven years maintained constant conflict for his rights. In 1840 Maria Christina resigned the regency in favour of Espartero, and in 1843 Isabella was declared of age by the Cortes.

The question of her marriage became an international affair in which England and France were involved. Eventually Isabella was compelled to marry her cousin, Don Francis of Assisi, a match which accounted for most of the unhappy events which afterwards marred Isabella's life. Continued insurrections broke out, and, in 1868, she was deposed and banished, and in 1870 abdicated in favour of her son, Alphonso XII. The remainder of her life was passed in Paris, where she died, April 10, 1904. See Carlos; Spain: History.

Isabey, JEAN BAPTISTE (1767-1855). French painter and lithographer. Born at Nancy, April 11, 1767, he went to Paris in 1786, where he studied under François Dumont and David. He displayed exceptional skill in miniatures and secured the patronage of Napoleon I and Josephine. He produced several esteemed lithographic plates. He died in Paris, April 18, 1855. His son Louis (1803-86) was also a painter. Consult *The Little Court Painter*, M. Osmond, 1947.



J. B. Isabey,
French painter
Self-portrait

Isaeus (4th century B.C.). One of the ten Attic orators. Probably born at Chalcis in Euboea, he taught rhetoric at Athens during 390-350 B.C. He is said to have been the pupil of Isocrates and the teacher of Demosthenes. A professional writer of speeches for delivery in the law courts, 50 orations under his name, of which 10 are extant in complete form, were

considered genuine. They deal with the subject of wills and inheritance, and are a valuable source of information on Athenian testamentary law. Pron. I-see-us.

Isaiah. A Hebrew prophet, the author of one of the books of the Bible. A son of Amoz, he lived in



Isaiah as depicted by Michelangelo on the ceiling of the Sistine Chapel, Rome

the 8th century B.C. He seems to have spent his life in Jerusalem and received his call "in the year that King Uzziah died," probably about 740 B.C. His wife is described as the prophetess (Isa. 8, v. 3), and his children were given names which were watchwords of his teaching, *Shear-jashub* (A-remnant-shall-return) and *Mahershalal-hash-baz* (Speeds-spoil-booby-hastens). His mission was to proclaim the will of God for his country in both domestic and international politics. The reign of Uzziah had brought a period of prosperity to Judah, but Isaiah perceived danger. There was widespread corruption, and oppression by the ruling class; while Judah, together with the neighbouring kingdoms, was constantly under threat of domination by Assyria.

Isaiah sternly denounced the corruption and injustice at home (chap. 3), declaring that destruction at the hands of Assyria would be the inevitable punishment for rebellion against God's laws, and that safety, at least for a remnant, could be found only in obedience to Him (chap. 1). He condemned the policy of alliances, first with Egypt and Ethiopia, and later with Babylon. His work was to some extent successful; the reforms of Hezekiah (2 Kings 18,

vv. 4-5) were brought about by the prophetic movement in which Isaiah played so great a part, and the country did retain a precarious independence until its final subjugation by Babylon in 586 B.C.

Most modern scholars agree that not all the Book of Isaiah dates back to the prophet. There are marked differences of style, language, and content between chapters 1-39 and the rest of the book; less certainly, between chapters 40-55 and 56-66. These three sections are referred to respectively as First, Second, and Third Isaiah (or Proto-, Deutero-, and Trito-Isaiah). Second Isaiah is chiefly notable for passages speaking of the Servant of the Lord, in which the O.T. reaches its zenith (chaps. 42, vv. 1-4; 49, vv. 1-6; 50, vv. 4-9; 52, v. 13-53, v. 12). Resemblances between these passages and the life of Christ have led Christians to regard these as Messianic prophecies. But probably the author, writing during the Exile, had in mind the universal mission of Israel for the salvation of the world, and was attempting to explain why God had allowed his chosen people to undergo the humiliation of exile. The remainder of the book, written after the return from the Exile (probably between 516 and 444 B.C.), carries on the same teaching of universalism, and also denounces idolatry in the old prophetic tradition.

Bibliography. The Book of the Prophet Isaiah, G. W. Wade, 1911; The Second Isaiah, C. C. Torrey, 1928; Introduction to the Books of the O.T., W. O. E. Oesterley and T. H. Robinson, 1934.

Isallobar. A map line drawn through places where equal changes of barometric pressure have occurred during the same period. An isallobaric chart may represent e.g. the distribution of pressure differences in half millibars over three hours. Isallobars outline regions of falling or rising pressure, the enclosed areas on the charts being usually regular in form. See Isobar.

Isandhlwana OR ISANDULA. Locality in Natal, S. Africa. It stands near the Tugela river, 105 m. N. of Durban, and is noted as the scene of a fight between the British and the Zulus, Jan. 22, 1879. A British army which had encamped here went out against the enemy, leaving a small force in charge of the camp. This was attacked by 10,000 Zulus, who formed part of Cetewayo's army, and fighting to the last, was

destroyed. The British losses were 800, and those of the native allies 500, only about 40 Europeans escaping alive. All the transport was taken. The S. Wales Borderers had only six survivors out of six companies. At Queen Victoria's wish, this was the last occasion on which British colours were carried into action. See Zulu Wars.

Isar. A river of Bavaria, Germany. Rising in Austrian Tirol, high up among the Alps, it flows N.E. through Bavaria to join the Danube near Deggendorf. Munich and Freising are on its banks, and its length is about 180 m., but owing to its rapid current it is not navigable.

Isarithm (Gr. *isos*, equal; *arithmos*, number). A term applied in general to a line on a map, such as contour lines, isobars, etc. An isarithm joins all points which have the same elevation, atmospheric pressure, etc., and separates areas of higher from those of lower pressure, etc. The term isopleth is sometimes similarly used. Lines referring to density of population are the chief isarithms without a special name.

Isatin (Gr. *isatis*, woad). An orange-red compound, discovered in 1841. It is prepared from indigo by the oxidising action of nitric or chromic acid. By the action of alkalis it is converted into isatinic acid, and into aniline on fusion with caustic potash. It is soluble in alcohol and ether.

Isauria. An ancient district of Asia Minor, between Pisidia and Cilicia. Its inhabitants were a rude and warlike people, addicted to brigandage. In spite of defeats by the Romans, it was not until the reign of Anastasius in the 6th century that they were finally conquered. Two East Roman emperors, Zeno and Leo III, were Isaurians by birth.

Ischia. Island of the Mediterranean, belonging to Italy. It is the ancient Pithecusa or Aenaria.



Ischia. The 15th century castle, approached from the island by a stone causeway

It lies off the Campanian coast, 16 m. W.S.W. of Naples, and is included in the prov. of Naples. It is 20 m. in circumference and has an area of 18 sq. m. Of volcanic origin, the island is mountainous, fertile in the valleys, and most picturesque. Its highest point is Monte Epomeo, 2,588 ft. There are hot springs at Porto d'Ischia. Ischia, the capital (pop., 1951, 10,018), is the seat of a bishopric and has a 15th-century castle. Casamicciola, noted for its hot springs, and Forio, a port on the W. coast, are other towns. Wine, corn, olive oil, and fruit are produced; tile and pottery making, straw plaiting, fishing are carried on. *Pron.* ees-keea.

Ischl. Town and health resort of Upper Austria, in the Salzkammergut. It is on the river Traun, at



Ischl. The Upper Austrian watering-place from the north, with the wooded hill of Siriuskogel

its confluence with the Ischl, 30 m. S.E. of Salzburg. Its fine buildings include a kurhaus, theatre, handsome parish church (restored 1877-80), and numerous villas of the Austrian nobility. Here are saline springs, including pine-cone, sulphur, salt water, mud, and vapour baths, with excellent bath establishments, salt works, and hydro-paths. Pop. 9,875. *Pron.* Iahl.

Iseo. Lake of N. Italy. It lies between the provs. of Bergamo and Brescia, 15 m. E. of Bergamo, and 609 ft. above sea level, and is traversed by the river Oglio, an affluent of the Po. It is 16 m. in length by $1\frac{1}{2}$ m. to 3 m. broad, has an area of 24 sq. m. and a maximum depth of 980 ft. It contains the island of Siviano. Iseo, a thriving town, with ancient walls and castle, is on a

branch line from Brescia, along the E. shore. There is trade in cereals, olives, sardines, eels, chestnuts, and wine; while silk spinning and dyeing are engaged in. Iseo is a favourite resort of tourists, and is the ancient Lacus Sabinus.

Iseran. Col. n'. Mountain pass of the Graian Alps, France. It is near the Italian frontier, in the dept. of Savoie, between Mont Cenis and the Little St. Bernard, and its alt. is 9,080 ft. The route leads from the Isère valley to that of the Arc. A splendid view of the wild valley of Bonneval and the peaks and glaciers around it may be obtained from the pass.

Isère. River of France, about 180 m. long. It rises in the Graian Alps on the Italian frontier and flows mainly west, joining the Rhône 7 m. above Valence. Its

swift current makes it unnavigable; but it was dammed in 1952, 60 m. above Grenoble, to produce hydro-electricity; a lake $12\frac{1}{2}$ m. long was created in the Tignes valley, submerging Tignes village which was rebuilt on the shore of the new lake.

Isère. Dept. of France, lying E. of the Rhône.

It is mountainous in the E. and S., where the Alps enter it, the Aiguille du Midi being over 13,000 ft. high. Grenoble is the capital; Vienne is another important place. Isère was formerly part of Dauphiné. Area 3,178 sq. m. Pop. (1954) 626,116.

Iser-Gebirge (Czech. Jizerské Hory). Mt. range of central Europe, on the frontiers of Silesia and Bohemia. The highest summits are the Tafelichte, 3,680 ft., and the Houfudor, 3,630 ft.

Isernia (anc. Aesernia). City of Italy, in the prov. of Campobasso. Situated among the Apennines, 78 m. N. of Naples, it is noted for its mineral springs. Isernia was one of the cities of the Samnites. It has medieval walls resting on cyclopean foundations. Pop. (1951) 10,853.

Iseult or **Yseult**. Two characters in the Morte d'Arthur. One, generally known as The Beautiful Iseult, was the daughter of King Anguish of Ireland, and married King Mark of Cornwall. She fell in love with Sir Tristram, who married the other Iseult of the White

Hands, daughter of King Howel of Brittany. There are many spellings of the name. See Tristan and Isolde; Tristram.

Isfahan. See Ispahan.

Isherwood, CHRISTOPHER WILLIAM BRADSHAW (b. 1904). A British novelist and dramatist. Born at Disley, Cheshire, Aug. 26, 1904, he was educated at Repton, Corpus Christi, Cambridge, and King's College, London. He taught English in Berlin, 1930-33, was a London journalist, 1934-36, and did script work for Gaumont British. A first novel, *All the Conspirators*, was published in 1928, and later novels included *Mr. Norris Changes Trains*, 1935 (in 1956 Gerald Hamilton, the original on whom "Mr. Norris" was based, published *Mr. Norris and I*); *Good-bye to Berlin*, 1939; *Prater Violet*, 1946. He published *The Condor and the Cows* (travel), 1949. Isherwood collaborated with W. H. Auden in three plays: *The Dog Beneath the Skin*, 1935; *The Ascent of F.6*, 1937; *On the Frontier*, 1938. Becoming interested in Yoga, he translated, e.g., *The Bhagavad-Gita*, 1944.

Ishim. River of the U.S.S.R. It rises in the mountains of the E. of Akmolinsk, Kazakh S.S.R., runs W., then N.N.E., and flows into the Irtysh at Ust-Ishim, Omsk region, after a course of about 1,000 m. The chief towns on its banks are Akmolinsk, Petropavlovsk, and Ishim.

Ishim. Town in Tiumen region of R.S.F.S.R. It is 155 m. S. of Tobolsk, on the left bank of the Ishim, on the rly. from Sverdlovsk to Omsk. It is the centre of a grain growing and dairying dist. A great fair is held annually in Dec. The town is one of the oldest in Siberia.

Ishmael. Son of Abraham by his wife's Egyptian maid Hagar. The jealousy of Sarai and the birth of Isaac some years later led to Hagar's being sent away with her son into the wilderness of Paran, where Ishmael married an Egyptian (Gen. 16-25). He was famed as an archer. His descendants occupied the land E. of Palestine. Mahomet claimed descent from Ishmael, who is said to be buried with his mother at Mecca.

Ishogo. Negroid tribe living in French Equatorial Africa. They occupy large villages on both banks of the middle Ngonye and in the upper Ogowe uplands. Their W. Bantu dialect is spoken also by the neighbouring Okanda and Apinji.

Ishtar. The goddess of love in Babylonia and Assyria, akin to the

Syrian and Phoenician Ashtoreth, Astarte. In Sumerian Ininna (lady of heaven), she was identified by the Akkadians with the planet Venus (Dilbat), and as an astral deity formed a triad with her father Sin, the moon, and her brother Shamash, the sun god, she presiding over dawn and dusk. In her primary role as goddess of fertility she was identified with other Sumerian mother-goddesses, and in her temples at Erech, Babylon, Asshur, Nineveh, and elsewhere she was served by hierodules. As Ishtar of Arbela, she was lady of battle, and is depicted on a lion's back brandishing bow and axe. She figures in many legends; the story of her descent into the underworld is doubtless connected with the life-cycle of her lover Tammuz.

Isin. City of ancient Babylonia, once on the Euphrates. On its probable site is Ishan Bahriyat, in the desert 15 m. S.E. of Diwaniya, Iraq. It attained a leading place after the fall of the IIIrd dynasty of Ur c. 2050 B.C. as the seat of an Amorite dynasty of 16 kings, some of whom claimed the title "king of Sumer and Akkad." Fragments of a law code of one of these kings, Lipit-Ishtar, have survived. A long struggle with the rival city Larsa ended in the victory of Rim-Sin of Larsa; soon after both were overthrown by Hammurabi of Babylon, c. 1760.

Isis. Egyptian goddess. Originally local, she became pre-eminently the great mother, sister-wife of Osiris, and mother of Horus. Represented in human form, she bore, like Hathor, the cow-horned sundisk. At her temples in Behbet and Philae her worship lasted till about A.D. 560. In classical times she was also revered in Greece, Italy, and throughout the Roman Empire, having her tonsured clergy, vestments, processions, and mysteries, partly assimilated by, partly imitative of, early Christianity. There was a temple of Isis at Pompeii; Plutarch (*De Iside et Osiride*) describes current beliefs about her.

Isis. Alternative name of a head-stream of the Thames (*q.v.*).

Iskanderun. Turkish name for Alexandretta (*q.v.*).

Iskasmi OR ISHKASHMI. Language of the Galcha sub-group of the Iranian branch of Aryan. It is spoken in the Ishkasham hill-tract, Badakshan prov., Afghanistan. It was unknown until a vocabulary and folk-tales were collected there by Stein in 1915, is allied to the dialects spoken at Zebak

and Sanglich, higher up the N. slope of Hindu Kush, and contains words reminiscent of the Zend-Avesta.

Isker. River of Bulgaria. It flows N. through the N.W. of the country to join the Danube above Corabia, and is 120 m. long. The upper Isker crosses the basin of Sofia and its valley is a pass through the Balkan Mts.

Isla. A river of Scotland. It rises in the Grampians on the N.E. of Angus, and flows 48 m. S.E. and S.W. through Strathmore to the Tay, which it joins 4½ m. S.W. of Coupar Angus. It is a salmon and trout stream, and makes two fine falls—Reekie Linn and the Slugs of Auchrannie, both in the Angus ravine, the Den of Airlie. *Pron.* eye-la.

Islam (Arab., making of peace). Name given in the Koran to the Mahomedan religion. As translated by Rodwell, Sura, 3, v. 79, reads: "Whoso desireth any other religion than Islam, that religion shall never be accepted from him, and in the next world he shall be among the lost." Allah is called the Author of Peace; and Islam is held by all believers in it to lead to the Abode of Peace. See Mahomedanism; Mahomet.

Islamabad. A town of Kashmir. It is 28 m. S.E. of Srinagar and stands on an eminence overlooking the Jhelum. It is noted for its Kashmir shawls. Until the 15th century it was called Anant Nag, after its holy reservoir. Pop. 10,700.

Islamabad is also the old name of Chittagong (*q.v.*).

Island. Piece of land entirely surrounded by water. Islands are usually classified as continental or oceanic. Continental islands consist of the same rocks as the neighbouring mainland, and are usually surrounded by shallow seas the floor of which forms part of the continental shelf.

Such islands belong to three groups: islets composed of resistant rocks, such as the Bass Rock, the surrounding softer strata having been worn away; large islands, such as the British Isles and those of N. Canada, separated from the continent by comparatively narrow, shallow channels; and the festoons of islands such as Japan, which are characteristic of the shorelands of the Pacific Ocean. A better name for such islands is destructional, which indicates that they are the product of the destructive forces of erosion, earth movement, etc.

Under this term Madagascar and Australia are included. They are

both relics of the former great southern continent of Gondwanaland. Similar smaller islands are Sardinia and Corsica, remains of an ancient Tyrrhenis, most of which is submerged.

Oceanic islands are usually far distant from the continental shores, surrounded by deep water, and are generally of either coralline or volcanic origin. The majority occur in the Pacific Ocean; the largest are in the Hawaiian, Fijian, New Hebridean, and Samoan groups. Coralline islands in general, are based upon submerged mountain peaks or volcanoes. Islands of this class are better called constructional, as they have been built up in the development of the earth's existing superficial conformation. This term includes, in addition to oceanic islands, those which occur along continental coasts either as developments from shingle-bars and sand-banks or as temporary outlying portions of a growing delta. The Bermudas, the Florida cays, and many W. Indian islets are constructional, but the main W. Indian islands, relics of an ancient Antillia, are destructional.

The *s* in island is due to a confusion with the old Fr. *isle*, the word being really compounded of A.S. *ig*, island, and land.

Islands, Bay of. (1) Bay of Newfoundland. On the W. coast, it penetrates some distance inland by three branches, receiving the waters of the Humber, and containing numerous small islands. Humbermouth is a small port at the head of the bay.

(2) A commodious, secure, and deep harbour in the North Island, New Zealand, on the E. side of the Auckland peninsula. The surrounding land is the Bay of Islands co., and Russell and Opuia are ports on the bay.

Islandshire. Formerly a detached portion of the co. of Durham, England. Islandshire consisted of land in the neighbourhood of Berwick-on-Tweed, together with the Farne Islands; it was incorporated in Northumberland in 1844.

Isas Malvinas. Spanish name for the Falkland Islands (*q.v.*).

Islay. An island of Scotland, most southerly of the Inner Hebrides, belonging to the co. of Argyll. Its greatest length is 25 m., its greatest breadth 19 m., and its area is 235 sq. m. The inhabitants are chiefly engaged in dairy farming and in rearing sheep and cattle; oats, barley, and potatoes are grown. Distilling

is an important industry. The island has a great quantity of peat, and some slate and marble are quarried. The surface is generally level, although there are several peaks over 1,000 ft. high. Lochs Indaal and Gruinart almost cut the island in two, making the W. portion a peninsula called the Rhinns.

Off Rhinns Point is Oversay, an island with a lighthouse. The S. end of the island is called the Mull of Islay. Bowmore is the chief town; others are Bridgend, Port Ellen, and Port Askaig, all on the coast. There is regular steamboat communication with Glasgow and other ports. Islay was the headquarters of the MacDonalds, lords of the Isles, and afterwards passed to a branch of the Campbells, whose seat was Islay House, near Bridgend. Pop. (1951) 4,266.

The Sound of Islay, 13 m. long and about 1 m. wide, separates Islay and Jura.

Isles, Lord of the. The title borne by the chieftains formerly ruling the Western Isles of Scotland, surviving only as one of the titles of a prince of Wales. The first of the line was Somhairle or Somerled, who helped to expel the Norse invaders from parts of the Hebrides in the 12th century, and exercised almost supreme authority over Argyll and the Isles until his death in battle with Malcolm IV of Scotland in 1164. His descendants, after much fighting, secured suzerainty over the Isles.

John MacDonald, a descendant of Somhairle, took the title about 1334, and is believed to have done homage to David II for his possessions about 1344. Edward III of England treated John as an independent chieftain in his dealings with David II, 1356-57. John was succeeded in 1387 by his son David who held the title until his death in 1426. Alexander, 3rd lord, made a determined rising against James

I, and at his death was actually engaged in another conspiracy against James II. His successor, John, was also turbulent and rebellious, and in 1493 his estates were declared forfeit by the Scottish parliament. After his death in 1498 the supremacy in the W. passed to the Campbells.

Islets of Langerhans. Island-like areas in the pancreatic tissue. First described by Langerhans in 1869, they secrete insulin (*Lat. insula, island*) which enables the muscles to utilise carbohydrates. Failure of this secretion results in diabetes. See Insulin.

Isleworth. See Heston and Isleworth.

Islington. Met. bor. of London, most populous London borough N. of the Thames. It is bounded S. by Finsbury and Shoreditch, N. by Hornsey, E. by Stoke Newington and Hackney, W. by St. Pancras; area 3,092 acres. The town hall in Upper St. was finished in 1930.

In the burial ground of the parish church of S. Mary, rebuilt 1751-54, used to be the graves of James Steward and Sir George Wharton, who killed each other in a duel in the time of James I. Adjoining is a hall built as a memorial to Daniel Wilson, bishop of Calcutta, one time vicar of Islington, who founded the Islington Clerical Conference in 1827. The Metropolitan Cattle Market, situated between York Way and the Caledonian Road, superseded the former markets of this nature at Smithfield and at Lower Road, Islington; it was opened in 1855. The famous "Caledonian Market" (*q.v.*) was held there until 1939. The Royal Agricultural Hall is within Islington; and on the east side of Liverpool Road is a branch



Islington arms

of the Royal Free Hospital, erected 1847-49 as London Fever Hospital. On Islington Green is a statue of Sir Hugh Myddelton (*q.v.*).

Until early in the 19th century Islington—the Iseldone and Isendone of Domesday Book—was a village among fields. It was famous for its archery butts, dairy produce, tea gardens, and ponds for duck shooting.



Islington. A corner of Canonbury Square, in a well laid out residential part of the borough

Charles and Mary Lamb lived at 64, Duncan Terrace, formerly Colebrook Cottage. Islington forms three bor. constituencies. Pop. (1951) 235,645.

Islip. Township of New York, U.S.A., in Suffolk co., on Long Island. It has several rly. stations and an airport. The Central Islip and the Pilgrim state hospitals are the country's largest institutions for the insane. Villages near by are noted for clams and oysters. In the vicinity are summer resorts and beaches. On Fire Island many writers and artists have homes. The township, named by settlers from Islip, Oxon, was incorporated in 1710. Pop. (1950) 5,254.

Ismail OR ISMALI. Rumanian form of Izmail (*q.v.*).

Ismailia OR ISMAILIYA. Town of Egypt, on Lake Timsa (through which passes the Suez canal) and the Sweetwater canal. It was founded in 1863 as h.q. for the construction of the Suez canal. It remained a base for British military forces until 1951.

Ismail Pasha (1830-95). Khedive of Egypt. The second son of Ibrahim Pasha, he was born in Cairo, Dec. 31, 1830, and after an education in Paris entered the diplomatic service. Viceroy of Egypt, 1863, he was four years later appointed khedive by the sultan, and by 1872 had cast off his former allegiance to Turkey. He started ambitious but unworkable projects of reform, and to pay debts had to sell his shares in the Suez canal; they were bought by the U.K. Forced to submit to Anglo-French financial control, he dismissed a ministry in 1879 and was straightway deposed by the sultan. He died at Constantinople, March 2, 1895.



Ismail Pasha,
Khedive of Egypt



Lord Ismay,
British soldier

Ismay, Sir Hastings Lionel ISMAY, BARON (b. 1887). British soldier. Educated at Charterhouse and Sandhurst, he was commissioned in 1905, and in 1907 joined the 21st cavalry. He served in Somaliland, 1914-20, and then filled a succession of staff appointments in the U.K. and India.

In 1938 he became secretary to the committee of imperial defence. As major-general he was chosen by Winston Churchill in 1940 as chief of his personal staff at the ministry of Defence. Promoted lt.-general in 1942, general 1944, and created a baron in 1947, Ismay was during March-Nov. of that year on the staff of Lord Mountbatten, viceroy and then governor-general of India. Appointed secretary for Commonwealth Relations in 1951, Ismay resigned in 1952 to become sec.-gen. of the North Atlantic Treaty organization, 1952-57. He was made K.G. in 1957.

Ismay, Thomas Henry (1837-1899). British shipowner. Born at Maryport, Jan. 7, 1837, the son of a shipbuilder, he was educated at Carlisle, and began his business career in 1853 in a shipbroker's office in Liverpool, starting in business for himself a few years later. In 1867 he bought a fleet of Australian clippers which became the White Star line, and next year, with W. Imrie, he founded the firm of Ismay, Imrie & co. Ismay died Nov. 23, 1899.

Ismid. See Izmit.

Ismir. See Izmir.

Isobar (Gr. *isos*, equal; *baros*, weight). Map line through places of equal barometric pressure at a given time. The widest use is in the preparation of weather forecast charts, when isobars have to be drawn for areas of the N. hemisphere at frequent intervals throughout the day. To compensate for the effects of altitude the readings are reduced to sea-level before being plotted on the charts. Pressure on one side of an isobar will be higher than on the other, and the isobar if continued over a large enough area will finish where it started, i.e. isobars form closed curves. Anticyclones are examples of such systems of contours, the pressure being highest at the centre; the reverse applies to depressions. Distribution at atmospheric pressure is indicated in the daily weather report.

Isobutylene (C₄H₈). Isomer of the hydrocarbon butylene. It is a gas at ordinary temperatures, but liquefies in freezing mixture. Three isomeric butylenes are known.

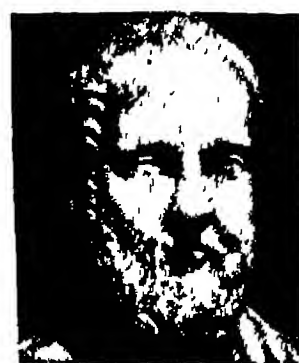
Isochronism (Gr. *isos*, equal; *chronos*, time). Oscillation of a body in the same time, whatever the amplitude of oscillation. The term was first used by Leibniz to denote a curve or isochronal line on which a heavy body descends in equal time. The vibrations of spiral watch-springs and the

cycloidal pendulum are examples of isochronism.

Isocline (Gr. *isos*, equal; *klinein*, to incline). In geology, term used to describe a fold in which the beds have been so compressed that the strata on either side of the crest or trough are approximately parallel. Isoclinal folds occur where intense mountain building movements have occurred, e.g. in the Alps and in the Scottish Highlands.

Isoclinic. Line drawn on a map through places for which the angle of magnetic dip is the same. Isoclinics follow approximately the lines of latitude on the earth's surface. The line of zero declination is called the Magnetic Equator.

Isocrates (436-338 B.C.). One of the so-called ten Attic orators. A pupil of the philosopher Socrates in early life, he gave up philosophy and started as a writer of speeches for clients to deliver in law cases. Unsuccessful at this profession, he started a school for preparing younger men for public life. He continued to compose speeches, but most of these dealt with public affairs, and were intended to be read. He was thus the first political pamphleteer.



Isocrates,
Athenian orator
From a bust

Isocrates cherished the dream of a Greece united for a great war against the Persians. He looked to Philip of Macedon to lead the Greek hosts, but that dream was rudely dispelled when Philip defeated the Athenians at Chaeronea. It is said that Isocrates committed suicide on hearing the result of the battle. Of his 21 extant speeches, the finest is the Panegyricus, in which he extols Athens as the natural leader of Greece. Isocrates occupies a notable place in the history of literature. His clear, smooth, and flowing Greek prose became the standard style for orators and schools of rhetoric. *Pron. eye-soc-rateez.*

Isodimorphism. A chemical term. A compound which crystallises in two or more forms possessing different molecular structures is said to exhibit dimorphism or polymorphism. Another phenomenon, isomorphism (*q.v.*), is shown by compounds which have an analogous composition and a closely related crystalline form. When two or more analogous substances are both dimorphous

and isomorphous, the phenomenon is called isodimorphism. The isometric pyrite group (pyrite, smaltite) and the orthorhombic marcasite group (marcasite, safflorite) are isodimorphous.

Isodynamic. Line drawn on a map passing through points on the earth's surface where the horizontal components of the earth's magnetic field are the same. The general trend of isodynamics is similar to that of isoclinics (*q.v.*).

Isogonic. A line drawn on a map through points having equal magnetic declination. The lines generally run N.-S. The angle for zero declination is called the agonic line; it follows approximately a great circle passing through the magnetic poles, N. and S. America, Europe, India, and Australia; a great sweep, known as the Siberian oval, passes round Japan and parts of Siberia and China. Between the two portions of the line, declination is easterly in the Pacific hemisphere, westerly in the Atlantic.

Isohel (Gr. *isos*, equal; *hēlios*, sun). Map line through places where the duration of sunshine is the same for the same period. Such lines show that, on the average, there is more sunshine on the coast than inland in the British Isles, and that the Sahara is sunnier than the Belgian Congo.

Isohyet (Gr. *isos*, equal; *hýelos*, rain). Map line through places where the total rainfall is the same during the same period. Mean annual isohyets for 30 ins. pass through all places having an average annual precipitation of that amount. In general, isohyets indicate mean conditions over a large number of years.

Isolation. Medically, the segregation of persons suffering from infectious disease, in order to prevent the spread of the malady. Isolation hospitals are provided for persons suffering from smallpox, and certain other infectious diseases, *e.g.* diphtheria and scarlet fever. If no epidemic rages, removal to a hospital is not insisted upon for some infectious diseases if efficient precautions can be taken in the home of the patient, and proper treatment is available. *See also* Notification.

Isolationism. The policy, especially in the U.S.A., of avoiding any governmental action that might involve international obligations. The term is of recent origin, but the policy goes back a long way. It found notable expression in Jefferson's declaration in 1801,

sometimes misattributed to Washington, that the U.S.A. sought "peace, commerce, and honest friendship with all nations—entangling alliances with none." There was a long period during which the Jeffersonian tradition prevented foreign relations from becoming a cardinal political issue. The enormous immigration from Europe helped, for many influential new citizens had crossed the ocean deliberately to free themselves from the domestic and international troubles of their native lands.

The war with Spain in 1898 introduced the U.S.A. to a new position of responsibility in international affairs. Disturbances in China gave the country an intimate concern in the domestic politics of the Far East. After the First Great War there was a bitter struggle at Washington between forces which favoured and those which opposed the U.S.A.'s taking a leading share in determining the future of Europe. The defeat of Wilson's endeavour to bring his country into the League of Nations was a conspicuous triumph for isolationism, which became the official doctrine of the Republican party, endorsed by the country at the 1920 election.

During the 1930s most Americans regarded with indifference the development of totalitarianism in the Old World, happy in the conviction that the Atlantic insured them against the risk of being involved in any but domestic problems. The outbreak of another war was not enough to dispel that illusory sense of security. One of F. D. Roosevelt's hardest tasks was to convince his countrymen that it was no longer possible for them to hold aloof. Even after the U.S.A. had entered the war, isolationism continued to dominate an important section of congress, the press, and the community. It was gradually weakened by the course of events, but, in spite of the U.S.A.'s outstanding contribution to the formation and maintenance of the U.N. and vast programmes of U.S. foreign aid, continued to exert some influence.

Herbert W. Horwill

Isolde. *See* Isoult.

Isomeric. Term applied to values of average monthly rainfall at a station expressed as percentages of the average yearly total. When these percentage values at a number of places for the same month are plotted, lines of equal proportion can be drawn.

Isomerism. Term used in organic chemistry to describe the fact that several compounds may be isomers, *i.e.* may be found to have the same molecular composition, but quite different chemical or physical properties. Three main types of isomerism are broadly recognized: structural isomerism, stereoisomerism, and ionisation isomerism.

Structural isomerism is restricted to those instances where the isomerism is due to a different joining of the constituent groupings or atoms. It is divided into a large number of sections of which the simplest types have in common only the molecular formula, the substances belonging to different chemical classes. Thus C_2H_6O may represent both dimethyl ether and ethyl alcohol, whilst C_2H_4O stands for acetaldehyde as well as ethylene oxide. In this type of isomerism the isomers differ widely in chemical and physical properties. Not quite so widely differentiated are the three amines propylamine, methylethylamine, and trimethylamine, all of which have the formula C_3H_9N , but which are primary, secondary, and tertiary amines respectively.

Chain isomerism is the term used to describe the various ways in which compounds of the same group (such as the paraffin hydrocarbons) having the same formula may be arranged. The hydrocarbon C_6H_{12} may represent normal pentane, isopentane, and neopentane. In ring-chain isomerism, represented by the series hexene, cyclohexane, methylcyclopentane, and ethylcyclobutane, etc., the difference between the isomers is the point of attachment of the chain with the double bond. Associated is the isomerism exhibited in the various *n*-hexenes, with the double bond at various positions in the chain. All these types may occur together, and in large molecules the possibilities for isomerism are enormous.

Yet another type of isomerism is exemplified by the relationship between the organic nitrites such as methyl nitrite, and the nitro-compounds. In both there is the grouping NO_2 , but in the first it is joined to carbon through an oxygen atom and in the second through the nitrogen. A similar isomerism exists between the sulphites and sulphonates.

The most important type of isomerism in aromatic compounds is positional isomerism which distinguishes between, for instance,

the *ortho*, *meta*, and *para* disubstituted benzenes, the symmetrical, unsymmetrical, and vicinal trisubstituted benzenes, the two monosubstituted naphthalenes, and the three monosubstituted anthracenes, and all the other combinations of substituted aromatic compounds. The term also covers isomers obtained by the different fusion of rings such as anthracene and phenanthrene.

Stereoisomerism covers isomerism in which the molecules have their constituent atoms or groupings joined in the same way, but differ in their arrangement in space.

Ionisation isomerism arises when a molecule has a structure in which both ionic (electrovalent) and covalent bonds exist. An example is the inorganic compound of cobalt.

Isometric. Name given to lines on meteorological charts showing the relation between pressure and temperature at constant volume.

Isomorphism. An important conception in mineralogy and crystallography. It has been found that certain minerals of analogous composition crystallise in closely related forms. The analogy is extended to the structure of crystal-lattices composed of geometrically similar units, each containing a similar arrangement of the constituent atoms. This phenomenon is isomorphism; it is shown by many groups of minerals which form an isomorphous series, *e.g.* calcite (CaCO_3), dolomite ($\text{CaCO}_3, \text{MgCO}_3$), magnesite (MgCO_3), siderite (FeCO_3), and rhodocrosite (MnCO_3). Members of an isomorphous series are often salts of metals contained in the same group of the periodic table.

The plagioclase feldspars are an excellent example of a series showing isomorphous mixture, there being a continuous gradation in composition, crystalline form, specific gravity, and optical properties from one extreme, albite (soda feldspar) to the other, anorthite (lime feldspar).

An allied phenomenon is isomorphous replacement, in which atoms, often of comparable size, replace others without appreciably altering the crystalline form of the compound; *e.g.* part of the zinc in sphalerite is often replaced by small quantities of iron, cadmium, and lead.

Isoneph (Gr. *isos*, equal; *nephos*, cloud). A map line through places where the average fraction of the sky covered by clouds is the same for the same period. Such

lines show that the U.S.A. has clearer skies than W. Europe.

Isonzo. River of Yugoslavia and Italy. It rises in the Julian Alps, and flowing S. for 82 m. issues into the Gulf of Trieste, 10 m. E. of Grado. Before 1919 its course was entirely Austrian; thereafter it was wholly Italian, until the peace treaty with Italy in 1947 gave its upper reaches, above a point just N. of Gorizia, to Yugoslavia.

The battles of the Isonzo in the First Great War were fought between Italian and Austrian armies, 1915-17. By the beginning of June, 1915, the Austrians had retired to positions along the river, most of them on the E. bank, but with important bridgeheads, particularly before Gorizia, the chief town on the river. The terrain was mountainous and strongly fortified. The Italian general Cadorna opened the first battle with a three-fold offensive on June 9. In the N. his forces advanced into the Plezzo valley, but failed to capture Tolmino; in the S. they drove the Austrians from the flat between the river and Monfalcone, occupying Monfalcone and Castelnovo; and in the centre they crossed the river N. and S. of Gorizia, but failed to carry the height of Podgora, which commands Gorizia from the W. bank.

In the second battle the Italians attacked in the central sector, July 2, and fighting continued until the middle of Aug. The third battle opened on Oct. 18, and the Italian artillery began to shell Gorizia. Fighting continued until Dec. The fourth battle began with a bombardment all along the river from N. of Gorizia to the sea, followed by a feint in the Monfalcone area which led the Austrians to reinforce their left at the expense of their centre. On Aug. 6, 1916, the Italians crossed the Isonzo at Sabotino and San Michele, and in three days had entered Gorizia. The attack was then switched to the S., and gains made in the Carso. During the winter both sides were preparing an offensive, and in 1917 there was more fighting, but with the disaster of Caporetto the Italians withdrew from the Isonzo for the remainder of the war.

Isoprene. Hydrocarbon obtained by the distillation of rubber. It is associated with the compounds called terpenes. Faraday, in 1826, isolated a pure compound from the destructive distillation of rubber which had the formula $\text{C}_{10}\text{H}_{16}$; it was the first substance

to be so isolated. In 1860 Williams succeeded in isolating a low-boiling liquid of the formula C_5H_8 , which he named isoprene. On heating at 280° it is converted into Faraday's compound, dipentene, later shown to be the racemic form of the terpene limonene; both these compounds occur in nature.

Isoprene is prepared by the thermal decomposition of pinene from oil of turpentine, or from *p*-cresol, and from acetone and acetylene. It can be polymerised, by the action of acids and other reagents, to give a rubber-like mass which is insoluble in alcohol and swollen by ether and carbon disulphide in the same manner as rubber: on destructive distillation it again gives isoprene.

Isosceles (Gr. *isos*, equal; *skelos*, leg). Word of Greek origin used for a triangle with two equal sides. The angles at the bases of the equal sides are also equal.

Isoseismal. Line drawn on a seismographical map to indicate the direction of the shock wave along which the intensity of any given earthquake is the same.

Isostasy (Gr. *isos*, equal; *stasis*, standing still, stability). Term for the doctrine that explains the greater elevations and depressions of the earth's surface as due to the crust rising high where its material is light, and lying low where the material is heavy. According to isostasy, blocks of the crust of equal area are of equal weight irrespective of the height of the surface, and each block is supported on a layer which behaves as a fluid and upholds the overlying crust to a superficial altitude dependent on the composition of the block. Mountains were naturally at first regarded as extra masses piled upon the crust and upheld by its strength, as a lighthouse is supported by the reef on which it stands; but, according to isostasy, mountains do not rest upon a rigid foundation, but float on a plastic substratum. The evidence for isostasy may be classified in four groups:

1. The theory was first adopted by geologists owing to the frequent coincidence between the rate of subsidence of the earth's surface and the rate of deposition of sediments upon the sinking area. They concluded that in many places the subsidence was due to the weight of the accumulating sediments.

2. Several countries have been covered by ice-caps like that of Greenland. This might have been due to heavy snowfall when the country was higher. It was found,

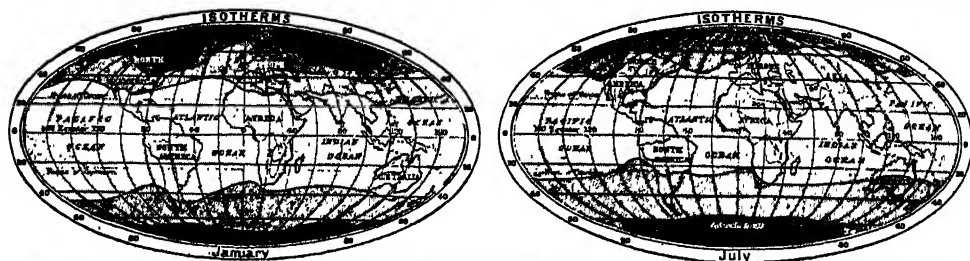
however, that the ice-covered lands were lower during their glaciation. Most of Great Britain, for example, before the Ice age stood several hundred feet higher than the present level; when the ice-cap was largest, the level of the land was lower than it is now, and with the removal of the load of ice the country was slowly upraised. Jamieson in 1865 suggested that the weight of the ice might have been the cause of the subsidence; he later attributed the subsequent recovery of level to the removal of the ice load.

The theory of isostasy is therefore strongly supported; but it does not follow that all changes in the level of the earth's crust are uniformly due to causes within the compass of the theory. Although the hills are being constantly planed down and the valleys systematically filled up, these surface features persist automatically in accord with the delicate isostatic equilibrium of the crust. See Geology; Ice Age.

Isotherm (Gr. *isos*, equal; *thermos*, heat). Map line through places where the temperature is

investigations into neon by positive ray analysis, the basis of which is to determine the ratio of the electric charge to the mass of the positive ions in an electric discharge tube containing neon or other elemental gas. Aston developed a mass spectograph, an electro-magnetic instrument designed to measure not only the charge and mass but also the velocity of particles.

Other workers proved that the isotopes of any one element all have the same atomic number Z , i.e. Z electrons outside the nucleus



Isotherm. Charts of the world's temperature belts; left, in the Southern summer; right, in the Northern summer

The stage of readjustment is not yet complete; the Baltic area, where the ice load was heaviest, is still rising.

3. Geological evidence has been supported by observations as to the varying weight of the earth's crust. It was pointed out by Pratt that levelling in N. India was liable to an error due to the pull of the mass of the Himalayas on the levelling instruments. The amount of this lateral attraction was carefully investigated and found to be much less than was expected. Its comparatively slight amount has been explained by the assumption that the height of the Himalayas is compensated for by the lightness of the material that lies beneath them.

According to the theory there is an equal weight of material in each block of the crust down to a level of compensation. On Hayford's estimate, a column 75 m. deep below the summit of the Himalayas weighs the same as a column of equal area 68 m. deep below the Bay of Bengal, where the sea is 2 m. deep, so that the two columns balance one another.

4. Hayford's support of isostasy is based on his study of the actual distribution of gravity in the U.S.A. The theory has also been supported by the determinations at sea by Hecker, who claims that the depths of the oceans correspond with the density of the mass below them.

the same for a given time or period. The mean July isotherm of 70° F. joins all places where the mean temperature for that month averaged over many years has this value.

To compensate for the decrease of temperature normally experienced with increase of height, corrections are usually applied to maps of regions where there are variations in level. This practice of reducing values to supposed equivalents at sea level decreases the practical utility of such maps, since they are not representative of the local temperature distribution.

Isotopes. Varieties of a chemical element which have virtually identical chemical properties but different atomic weights and may have different combining proportions with other elements. Tin, with a chemical atomic weight 118.70, is a mixture of substances having atomic weights between 112 and 124; these always occur in the same proportion, to give a mean of 118.70.

In 1888 Crookes first propounded the possibility of isotopes by suggesting that the departure from the whole number rule in the atomic weights of many elements was due to their being mixtures of components. In 1910 Soddy confirmed the existence of isotopes, naming them isotopic elements because they occupy the same place in the periodic table. Knowledge was extended by J. J. Thomson's

of the neutral atom, but have different atomic masses. The chemical properties of an element are assumed to be due to the arrangement and action of extranuclear electrons, whereas variations in atomic mass among the isotopes of the same element are due to differences in the structure of the nucleus. Most elements are mixtures of two or more isotopes, and their atomic weight represents an average. Apart from those of hydrogen, which has three isotopes with atomic masses 1, 2, and 3, the chemical properties of isotopes are for most practical purposes indistinguishable.

Physical methods depending upon atomic mass used for their separation include:

(a) *Diffusion.* This depends on the fact that the rates of diffusion of atoms or molecules are inversely proportional to the square roots of their masses. Hertz utilised the diffusion method to separate the isotopes of neon, his apparatus consisting of 48 porous diffusion tubes incorporated in 24 pumps connected in cascade.

(b) *Thermal diffusion.* Introduced by Clauudius and Dickel, this depends on the phenomenon that in a mixture of gases there is tendency for the heavier molecules to be attracted to the cold part of an unequally heated enclosure, and for the lighter molecules to be attracted to the hot part. In a vertical tube a central heated wire

has the effect of separating light and heavy isotopes in the gas; thermal conversion thereupon causes the light isotopes to flow to the upper end of the tube and the heavier to travel downwards.

(c) *Mass spectograph*. Both (a) and (b) yield only slight separation at each stage, necessitating a large number of stages. The mass spectograph as yet can ionise only a small fraction of gas to form the initial beam essential to separation, but has proved valuable in obtaining the final stage in the isotopic separation of elements already treated by (a) or (b).

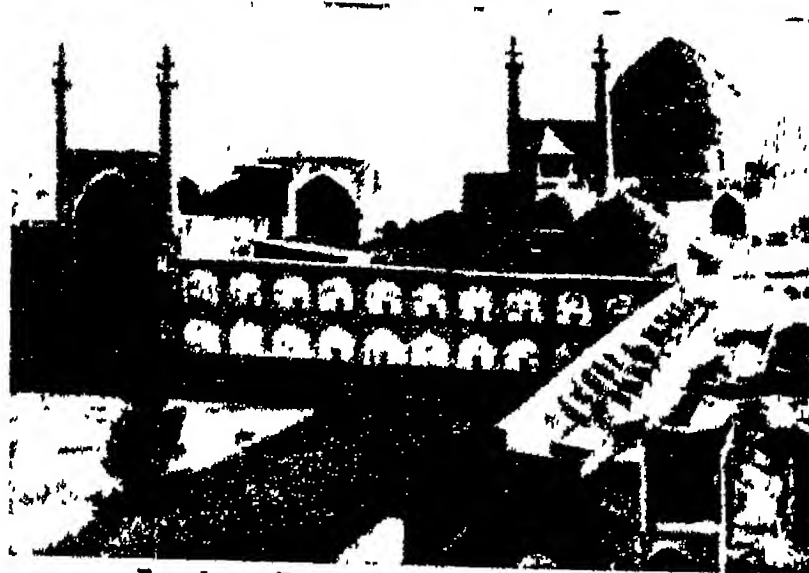
(d) *Electrolytic separation*. This is used for the isotopic separation of light elements such as hydrogen. The different ionic mobilities of heavy and light hydrogen in the solution are caused to yield an increasing percentage of heavy water. To obtain a tenth of a gramme of heavy water, electric current in the region of 3,000 ampere hours is needed.

(e) *Reaction separation*. This involves exchange reaction between isotopically different molecules. With a gas and a liquid in which light and heavy molecules are exchanging, an appreciable difference in concentration of light and heavy isotopes will exist in the gaseous and liquid phases.

From 1945 new artificial isotopes of almost every known element were made in atomic reactors. All of these were radio-active, and many proved of great value as tracer elements in biological and physical research. Others, notably radio-iodine (iodine-131), were effective in medical diagnosis, while radio-cobalt (cobalt-60) was used in place of radium for the treatment of certain forms of cancer.

Isotropy (Gr. *isos*, equal; *tropos*, character). In physics, the property of a body by which it has the same characteristics in any direction about a point. Crystals are said to be optically isotropic when the speed of light through them, and hence the refractivity, is the same in all directions. When bodies exhibit different properties in different directions they are said to be aeolotropic or anisotropic. Bodies which are normally isotropic may become aeolotropic under the action of external forces: glass subjected to strain becomes doubly refracting.

Isovol. One of a series of lines drawn on a map of a mineral area to indicate the volatile content of coal seams. Isovals provide an index of the volatile and chemical



Isfahan, Persia. The Grand Mosque

nature of the coal, and show where each different type occurs. An isovol map usually contains a graph giving the volatile and carbon percentages, calorific value, and coking properties.

Isfahan OR ISFAHAN. City of Persia, the ancient Aspadana, and formerly capital of the country. It is on a fertile tableland 5,500 ft. above sea level, and is about 200 m. S. of Teheran. During its greatest prosperity under Shah Abbas, 1586-1628, it was one of the largest cities of Asia, with a pop. of nearly a million, and possessed many palaces and other fine buildings, some of which still stand, notably the Palace of the Forty Pillars, the Chihil Situn, and the Grand Mosque. It was partly destroyed in 1722. A large trade is carried on in tobacco, opium, cotton, and fruits, particularly almonds, and there are manufactures of gold and silver ware, carpets, pottery, armour, and matches. A feature of the city is the fine bridge across the river Zende Rud. Pop. (1956) 254,876.

Israel. Republic of W. Asia lying within the region called historically Palestine. It came into existence at 4 p.m., May 14, 1948, eight hours before the expiry of the British mandate for Palestine. David Ben-Gurion (*q.v.*) was first prime minister, and Chaim Weizmann (1874-1952) became provisional pres. (formally elected 1949, re-elected 1951). The new state, declared open to all Jews, was accepted as a member of the U.N. in 1949. It had immediately to contend with military action by neighbouring Arab states (*see* Palestine). Internally, fighting between Hagana (which had been made the regular defence force) and Irgun, a terrorist body, led to disbandment of Irgun, which transformed itself into the Heruth (freedom) political party; another terrorist band, the Stern gang, responsible for the assassination of Count Folke Bernadotte (*q.v.*), was outlawed, and its leaders were

tried and sentenced but released under an amnesty. An evolutionary constitution, to be implemented over a period, was adopted by the kneset (parliament) in 1950. The president's term of office was in 1951 fixed at five years; the kneset, a single chamber of 120 members, is elected for four years by universal secret suffrage. The pop., which had been

842,000 in 1948, had by 1957 increased, chiefly by immigration, to 1,872,000 of whom 1,668,000 were Jews, 140,500 Muslims, 44,500 Christians, and 19,000 Druses. The area, as determined by armistice agreements in 1949 with Jordan, Lebanon, Syria, and Egypt, was 8,048 sq. m. Nearly all the land was placed under national ownership in 1950. Jerusalem, of which the Jews held only part, was declared capital of Israel in 1950. Border clashes between Israeli and Egyptian patrols were frequent, and came to a head on October 29, 1956, when the Israeli army attacked Egyptian forces in the Sinai peninsula. For an account of these hostilities, *see under* Egypt. Consult Israel, N. Bentwich, 1953; Israel and Her Neighbours, N. Bentwich, 1955.

Israel (Heb., perseverer with God). Name given by God to Jacob (Gen. 32 and 35). It became an appellation in the term "children of Israel" (or Israelites), i.e. the twelve tribes descended from the sons of Jacob. With the virtual disappearance of the other tribes it was used loosely to denote only that of Judah.

Israels, JOSEF (1824-1911). A Dutch painter. Born at Groningen, Jan. 27, 1824, he studied under Kruseman in Amsterdam and later in Paris. In 1855 he exhibited at the Salon The Prince of Orange opposing the Decrees of the King of Spain. A painter of genre pictures, he found his subjects among fisher-folk and peasants. Among his pictures are Evening on the Shore, Happy Old Age, The Eve of Separation, The Ship, The Anxious Family, The Sleepers, The Cobblers' Repast, Alone in the World, Interior of the Orphan Asylum at Katwijk. He was also



Josef Israels, Dutch painter

an excellent portraitist. He died at The Hague, Aug. 10, 1911.

Israfil. One of the four principal angels of Mahomedanism. His office will be to sound the trumpet at the resurrection.

Issik-Kul. A lake of Central Asia, in Kirghiz S.S.R. Its area is 2,300 sq. m. and depth 1,400 ft. Now a closed basin, and constantly diminishing, it once communicated with the river Chui. The water is brackish and unfit to drink; the banks are haunted by tigers and wild boars. The name means warm lake. Karakol stands at the E. end. Issik-Kulsk is the name of a region of the republic.

Issoire. A town of France, in the department of Puy-de-Dôme. It stands on the Couze, a small tributary of the Allier, 30 m. S.S.E. of Clermont-Ferrand. It is an old town, its chief building being the 12th-century Romanesque church of S. Paul. It is a centre of agricultural trade. Pop. (1954) 8,541.

Issoudun. Town of France, in the dept. of Indre, on the river Thèols, 17 m. by rly. N.E. of Châteauroux, on the route to Bourges. The town, a subprefecture of the dept., is chiefly industrial, with leather works and breweries, but is also an agricultural and wine centre. The 15th-century church of S. Cyr has an E. window in late decorated style, and in the garden of the hôtel de ville is the 12th-century Tour Blanche. Issoudun was the Roman Exoldunum. Pop. (1954) 12,945.

Issue (Lat. *ex*, out; *ire*, to go). Word meaning something that arises from something else. In law it is used both for descendants and for the end of anything, *e.g.* the issue of a trial or contest. In the former sense it is frequently used in reference to property, especially in wills and bequests. In a lawsuit, issue means strictly the matter to be tried. Thus if A sues B for £100 money lent, and B denies the loan, the issue is whether A lent B £100. But if B admits the loan, and alleges that he repaid it, the issue is whether B repaid A.

Issus. Ancient port of Cilicia. It stood on the gulf now called that of Iskanderun, or Alexandretta, and is celebrated for the battle fought in a defile near by in 333 B.C., between Alexander the Great and Darius III, the latter being totally defeated. Near here also Septimius Severus defeated Pescennius Niger in A.D. 194, and Heraclius overcame the Persians under Chosroes in 622.

Issy-les-Moulineaux. S.W. suburb of Paris, in the dept. of Seine. It lies on the left bank of the Seine, just outside the fortifications, and is contiguous with Vanves on the E. It is connected with Paris by electric rly., and there are steamboat landing places on the river bank. The Fort d'Issy forms part of the system of fortifications of the capital. Industries include a state tobacco manufactory. Pop. (1954) 47,369.

Istanbul. Chief city and port of Turkey (formerly called in English Constantinople, from its ancient Greek name Constantino-polis), capital until 1923. Istanbul gives its name to a vilayet, 2,120 sq. m. in area, with a pop. (1955) of 1,542,941. The city (1,214,616) is situated picturesquely on both sides of the south end of the Bosphorus, its nucleus being the district on the Golden Horn, an inlet of the Bosphorus 4 m. long, and up to 130 ft. deep, crossed by two bridges. On the peninsula formed by it and the Marmara Sea is situated old Stambul, with the remnants of old Byzantium: the Hagia Sophia cathedral, since 1453 the main mosque; the Atmeidan—the ancient hippodrome—with the old Greek "burnt column," the obelisk of Theodosius (A.D. 390) and the column of Constantine; a number of churches built 300–1400; and the old walls of the city built by Theodosius in the 4th cent., with 27 gates. There, too, are situated the main Turkish buildings: the Suleimanije mosque (1550–66), the most beautiful Ottoman building; the Bajazid (1497–1505), Achmed (1608–14), Selimje (1520–23), and other mos-

ques; the Soliman mausoleum, and the old bazaar, a huge labyrinth of covered shopping lanes built 1461 and several times renovated; the Seraskierate (former war office) with a tower 400 ft. high; the Top-Kapu Serai, former palace of the sultans, includes the buildings of the sublime porte, the Ottoman government.

Istanbul's other quarters mostly preserve a specific racial or national character: Galata, N.E. of the Golden Horn and rising to some height, is the district of the "Frenks," *i.e.* the foreigners; the adjoining Pera that of Western Europeans, formerly of the embassies; W. of Pera is Kassim-Pascha, essentially Turkish and possessing many old timber-frame buildings with balconies and projecting alcoves; there the naval institutions predominate. N. of it lie the Greek suburb of S. Dimitri, and the Jewish one of Chaskoi; in other areas are concentrations of Armenians, Russians, etc.; and on the Asiatic side of the Bosphorus is the suburb of Scutari, where the Anatolian and Bagdad rlys. start, and where one of the largest cemeteries in the world attracts visitors. Another cemetery, about 3 m. inland along the Golden Horn, is near the Eyub mosque, a building where relics of the Prophet—sword and flag—attributes of the Sultans' rôle as Caliph, were preserved.

Many of the former court and government buildings, *e.g.* the palace Dolma Baghtje on the Bosphorus, the Seraskierate, etc., have since 1923 been in the hands of the university and the technical high school, and are used as museums.



Istanbul, Turkey. Plan of this Ottoman city on the Bosphorus



Istanbul, Turkey. 1. Monument to Kemal Atatürk in Taksim Square, Pera. 2. The Galata bridge, looking towards old Stambul. 3. The Atmeidan, covering the site of the Hippodrome; the masonry pillar in the foreground was once covered with bronze plates, but its origin is unknown; beyond it is the surviving fragment of a bronze serpent pillar brought from Delphi by Constantine; beyond that again, the obelisk of Thothmes III, brought from Heliopolis by Theodosius; in the background is S. Sophia. 4. Tram terminus at the Pera end of the Galata bridge. See also S. Sophia illus.

Without industries of importance Istanbul exports furs and skins, mohair and wool, silk, figs, tobacco, etc., and Turkish art-craft products such as carpets and rugs, embroideries, and filigree work. Public institutions include the university, the technical high school, and schools of commerce, art, pharmaceuticals, and veterinary surgery; a museum of antiques, with the beautiful (though probably misnamed) Alexander sarcophagus, a masterpiece of antique sculpture; and an archaeological institute. There are 700 mosques, 172 churches of different denominations, and 40 synagogues; it is the seat of a Greek Orthodox patriarch, a Greek-Bulgarian archbishop, a Bulgarian Orthodox Metropolitan, an Armenian patriarch, a Jewish chief rabbi, and the Sheik-ul-Islam.

Apart from its unique geographical situation and its extremely colourful popular quarters where old oriental manners and houses blend with up-to-date western buildings, ways of life, and comfort, its plane-trees

and its hundreds of stone fountains (*tchechmes*), frequently richly carved, are among Istanbul's most striking attractions. Sanitary conditions have improved since the days of the sultanate. Owing to the maintenance of old and primitive ways—e.g. the use of a Roman water-conduit—they were long unsatisfactory. Nevertheless, Istanbul could boast the greatest number of reputed centenarians of any city in the world.

HISTORY. Constantinople, founded by Constantine the Great in 330 as a new capital for his empire, occupied the site of the Greek city of Byzantium. Constantine desired to make his new city the capital of the whole Roman empire, and with that object seized all the art treasures in the principal cities of Greece for its embellishment.

Whereas Byzantium covered only two hills, Constantine's first city occupied five, two more being included a century after his death, so that Constantinople, like Rome, stood on seven hills. In 413 this enlarged city was surrounded by a high, fortified wall, about 13 m.

in length, as the main defence against the barbarians.

For a thousand years, more fortunate than Rome, Constantinople resisted the Goths and bought off the Huns. Belisarius saved it from the Bulgarians; it withstood the Persians for ten years, and saw Chosroes, the Sassanide, retire baffled from its walls. The famous Caliph Haroun al Raschid was not more successful. Indeed, the city might have claimed impregnability had it not been taken by the Crusaders in 1204 under Baldwin of Flanders. They marred a remarkable military exploit by so ruthlessly sacking the place that many of the choicest specimens of the art of ancient Greece were lost for ever. The Venetians alone showed good taste in carrying off the Horses of Lysippus to decorate S. Mark's, Venice.

The direct consequence of this capture was the establishment of a family of Latin emperors at Constantinople. This, however, ruled only 57 years, and in 1261 the Greek rulers were restored in the person of Michael Palaeologus. A hundred years later the Turks

appeared on the scene, and on May 29, 1453, after a valiant defence, they captured the city. They have remained in possession of it without a break except for its occupation by British, French, and Italian troops after the First Great War, from Nov. 13, 1918 to Oct. 2, 1923.

Edgar Stern-Rubarth, Ph.D.

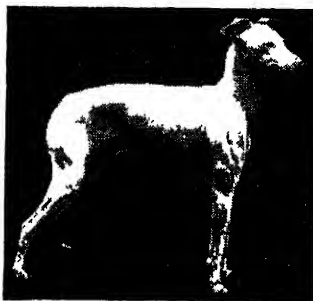
Isthmia OR ISTHMIAN GAMES.

One of the four great athletic festivals of ancient Greece, the others being the Olympic, the Pythian, and the Nemcan. The festival was held every two years, in spring and summer alternately, near the isthmus of Corinth in honour of Poseidon, god of the sea. Theseus, legendary king of Athens, was traditionally regarded as the founder of the games at which musical and dramatic as well as athletic contests were held. See Olympic Games.

Isthmus (Gr. *isthmos*). Narrow neck of land either uniting a peninsula to the mainland or joining two continents together. Examples of the first are the isthmuses of Corinth, Kiel, and Kra (Malay Peninsula); of the second, those of Panama and Suez. The cutting of a canal through an isthmus often shortens shipping routes.

Istria (Yug. *Istra*). Peninsula at the head of the Adriatic Sea. The land boundary lies on the slopes of the Karst or Carso mountains overlooking the narrow strip of lowland between Trieste and Fiume. It includes the Quarner (Quarnero) islands, Krk, Cres, etc. Formerly Austrian, it passed to Italy after the First Great War, becoming part of Venezia Giulia region. Under the peace treaty with Italy, 1947, it was transferred to Yugoslavia except for the W. part as far S. as Cittanuova (Novi Grad), which comprised the territory of Trieste and was in 1954 divided between Italy and Yugoslavia.

Istria is 62 m. long, its greatest width is 47 m., and its area 1,913 sq. m. To N. and N.W. the peninsula is mountainous, an outlier of the Eastern Alps, reaching over 4,000 ft. near Laurana, on the Gulf of Fiume. The W. and S. form a lower plateau with a ridge flanking the E. coast and a gentle slope to the W.; here the limestone provides characteristic Karst phenomena. The W. coast has many bays used by fishermen, but too shallow for larger vessels; the harbour of Pola in the S., formerly the Austrian naval port, is an almost landlocked basin extending inland for 2½ m. The Queto, 32 m.,



Italian Greyhound. Noways Serenade Silverhower, a champion specimen

is the chief river, while many streams vanish in swallow holes. Rain falls in spring and autumn when the sirocco blows; the bora and other winds are dry. Maize and wheat are the chief cereals, while vines, olives, and mulberries are grown. Fishing is important.

The pop. is a mixture of Italians, Croats, and Slovenes. Pola (*q.v.*) was, under the Italians, the largest town, while Pisino was a former capital. Rovigno is a flourishing small port. The rly. system is a relic of Austrian strategy. One line goes S.E. from Trieste to Fiume; another goes S. to Pisino, a great road centre, and Pola, with a branch to Rovigno. See Italy; Trieste; Yugoslavia.

Itacolumite. Yellow sandstone rock chiefly composed of quartz, but containing also mica, talc, chlorite, etc. Found extensively in Brazil, it has the remarkable property of being flexible when cut into thin sheets. The sheets or plates can be bent backwards and forwards to such a degree as to give the rock the alternative name of flexible sandstone. The rock is one of the sources of Brazilian diamonds.

Itagaki, Taisuke, COUNT (1837–1919). Japanese statesman. He served with the emperor's troops in the insurrection of 1868, and became an ardent imperialist. He held cabinet office in 1871–73, but resigned and founded a school of liberalism which earned him the name of the Japanese Rousseau. A student of Western political systems, he was a member of governments in 1878 and 1880, and as leader of the constitutional party, founded by himself, became minister for home affairs in 1898. In 1900 he retired from public life. He had been ennobled in 1887, and was converted to Christianity. He died July 23, 1919.

Itajahy. Seaport of Brazil, in the state of Santa Catarina. It stands near the mouth of the river

Itajahy, 50 m. N. of Florianopolis. Exports include timber and tobacco. Pop. (est.) 34,000.

Italian Greyhound. An aristocratic toy breed of dog of great antiquity and uncertain origin. It is slender and graceful with small delicate bones, long arched neck, and fine muzzle. The coat is thin and glossy; weight 6–8 lb.; colour: all shades of fawn, white, cream, blue, black, and fawn and white pied. It is intelligent and affectionate, and though so tiny, is a sporting breed. Like all the greyhound family, it hunts by sight.

Italian Sixth. In music, a chromatic chord consisting of a bass note with a major third and augmented sixth above it, thus: It belongs essentially to the key of its middle note—in this example C, but can be used also in other keys. The origin of the name is uncertain. See Harmony; Interval.

Italic (Lat. *italicus*). In printing, a type, the letters of which slope up towards the right, as in the Latin word at the beginning of this paragraph. Originally called Aldine or Venetian, and known also as cursive, it was first used in an edition of Virgil printed at Venice in 1521 by Aldus Manutius (*q.v.*), and dedicated by him to the Italian states. It is said to have been made from an imitation of the handwriting of Petrarch made by an engraver, Francisco da Bologna. Its introduction has been attributed to a desire, by economy of space, to avoid the repetition of contractions, and as first used the capital letters were upright, as in ordinary type. It was adopted in France in 1521, in England in 1524. In the Bible its use is restricted to words introduced to make the sense clearer. At one time prefaces to books and all proper names were printed in italic. Later usage is for emphasis, foreign words, side-headings, cross-headings, and to distinguish names of books, newspapers, periodicals, ships, etc., a practice that is becoming more and more restricted with a view to giving a type-page a neater and more uniform appearance. In MS. for the printers, words to be in italic are underlined.

In another sense the word Italic means of or pertaining to ancient Italy or its people. It is also applied to an order of architecture—the Composite; and to the Pythagorean and Eleatic schools of philosophy. See Printing; Typography.



ITALY: ITS GEOGRAPHY, HISTORY, AND ARTS

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An account of the geography of Italy, centre of the Mediterranean, is here from the end of Rome's empire followed by the history of the country and of its literature and unsurpassed art. See also Rome; East Africa Campaign; Fascism; Italy, Campaign in, 1943-45; North Africa Campaigns, etc.; articles on the cities and towns, and on such famous Italians as Cavour; Dante; Garibaldi; Mussolini

Italy, a peninsula jutting into the Mediterranean from the south of Europe, is bordered by the Tyrrhenian, Ionian, and Adriatic seas, and by the arch of the Alps. By the peace treaty of 1947, its former W. frontier with France was modified slightly in France's favour, its E. frontier in Yugoslavia's and to create the free territory of Trieste; under an agreement in 1954 the town of Trieste was re-annexed to Italy, and the Free Territory was apportioned between Italy and Yugoslavia. Within these 1954 boundaries, Italy had an area of 116,226 sq. m., compared with 119,733 sq. m. before the Second Great War.

The geographical position of Italy is noteworthy: it projects into the middle of the Mediterranean basin, with Sicily less than 100 m. from the N. African coast, and Messina roughly equidistant from Gibraltar, Suez, and Odessa. This position has made Italy an intermediate land between Europe and Africa as well as between western Europe and the Near East.

Geological Structure

Geologically, Italy is a younger land than the Iberian peninsula, presenting a great variety of tectonic phenomena, although the crystal strata which abound in the W. Alps and in the Calabro-Sicilian region are often mistakenly considered to belong to the archaic period. By the conformation of the land, and the variety of its landscape and geological nature, Italy is divided into three parts, the Alpine region, the Lombard or Po region, and the peninsular or Apennine region.

The Alpine region in itself is very varied. It includes great deep valleys with steep flanks, often terraced, and due to ice-modelling of the Quaternary period. These valleys have had great importance in relation to the settlement of human communities and the development of cultivation and communications. The greater valleys lead into the pre-Alpine zone, which, especially in the Lombard and Venetian regions, is divided from the Alps proper by a series of well-defined, longitudinal lesser valleys.

Below the pre-Alps is a sub-Alpine zone, of softly undulating

hills which, geologically, are the tail-end of the great peripheral tongues of the ice period. Some of these hill ranges enclose large and deep lakes, e.g. Maggiore, Como, Garda. The variety and richness of vegetation in these parts, in particular the mulberry, have contributed to the development of flourishing industries.

Lower still lies the vast northern plain or Po valley. The Apennines traverse the whole of the peninsula, running southward from the Ligurian region to the "toe" of the "boot." The Sicilian mts. also are in part of Apennine type. The island of Sardinia has a different structure, belonging, like Corsica, to a formerly submerged land.

The mountain ranges and geological conformation of Italy have created many rivers, the most important of which are the Adige, the Po, the Arno, and the Tiber; but none, except in part, is suitable for navigation. Many of the smaller rivers dry up in the hot summers.

The climate differs considerably from N. to S. The Dolomites lie between the 46th and 47th parallels, while the 38th parallel cuts the southernmost part of the peninsula. The climate of the N. is Continental in character while that of the peninsular section is Mediterranean. The rainfall is about 30 ins. on the lowlands and 50 ins. or more on the uplands. The N. and the mountains of the peninsula have a heavy snowfall; many parts of the Italian Alps show perpetual snow. Italy also has three active volcanoes, viz.: Vesuvius (c. 3,890 ft.) overlooking the bay of Naples, Etna (10,755 ft.) in Sicily, and Stromboli (3,040 ft.) on an island of the same name in the Tyrrhenian sea.

Varied Fauna

The fauna is rich and varied. On the Alps and occasionally in the Abruzzi mts. can still be found ibex (*Capra ibex*) and chamois (*Rupicapra rupicapra*). The stag, rare, is found on the E. Alps; characteristic of Sardinia are deer (*Dama dama*) and mouflon (*Ovis musimon*). There are many boars, especially in Sardinia; and bears can still be found in Abruzzi. Wolves exist in the central and

southern Apennines, and in Sicily. In the Alps ermine are found, and many birds, occasionally eagles.

Italy is divided into 19 regions, 92 provs., and has more than 7,500 cities and towns. The total pop. in 1951 was 47,515,537—just over 400 to the sq. m. Three cities had more than one million inhabitants: Rome, 1,701,913; Milan, 1,276,521; and Naples, 1,024,543. The people, though Mediterranean in character, show influences of the many migrations which have crossed Italy from N. to S. and E. to W.

Economic Conditions

Agriculture is the basis of Italy's economic life: 49.4 p.c. of the soil is cultivated, 20 p.c. is natural pasture, 18 p.c. is covered by woods. In the census of 1951, 8,261,160 persons returned agriculture as their main occupation. Wheat, maize, olive oil, rice, fruit, and the vine, from the grapes of which excellent and varied types of wine are made, are the chief food crops. Flax and hemp are grown, some cotton and tobacco. Another natural resource is timber.

Italy's mineral products are of secondary importance, the most noteworthy being sulphur in Sicily, formerly the largest output in the world (national output in 1955: 1,608,000 metric tons); and mercury in Tuscany. The only coal is a poor kind of lignite. This explains the great development, especially in the N., of hydro-electric power; in 1955, of the total power generated (38,124 million kWh), 30,800 million kWh was derived from hydro-electric plants—more than twice the production of 1938. Aluminium, graphite, marble (of which there is great variety, beginning with the white marble of Carrara, the exploitation of which constitutes a flourishing industry), and sea salt (obtained from seven active salt-beds in Sardinia, Apulia, and Sicily) are other mineral products. There are several sources of mineral waters (San Pellegrino, Fiuggi, etc.), and hot medicinal springs occur at Salsomaggiore, Montecatini, Agnano, Albano, etc.

After the Second Great War reserves of natural gas and petroleum were located and gradually brought into production in the Po plain, in peninsular Italy, and in the



Italy. Map of the republic, showing the boundaries after the cession of Trieste in 1954

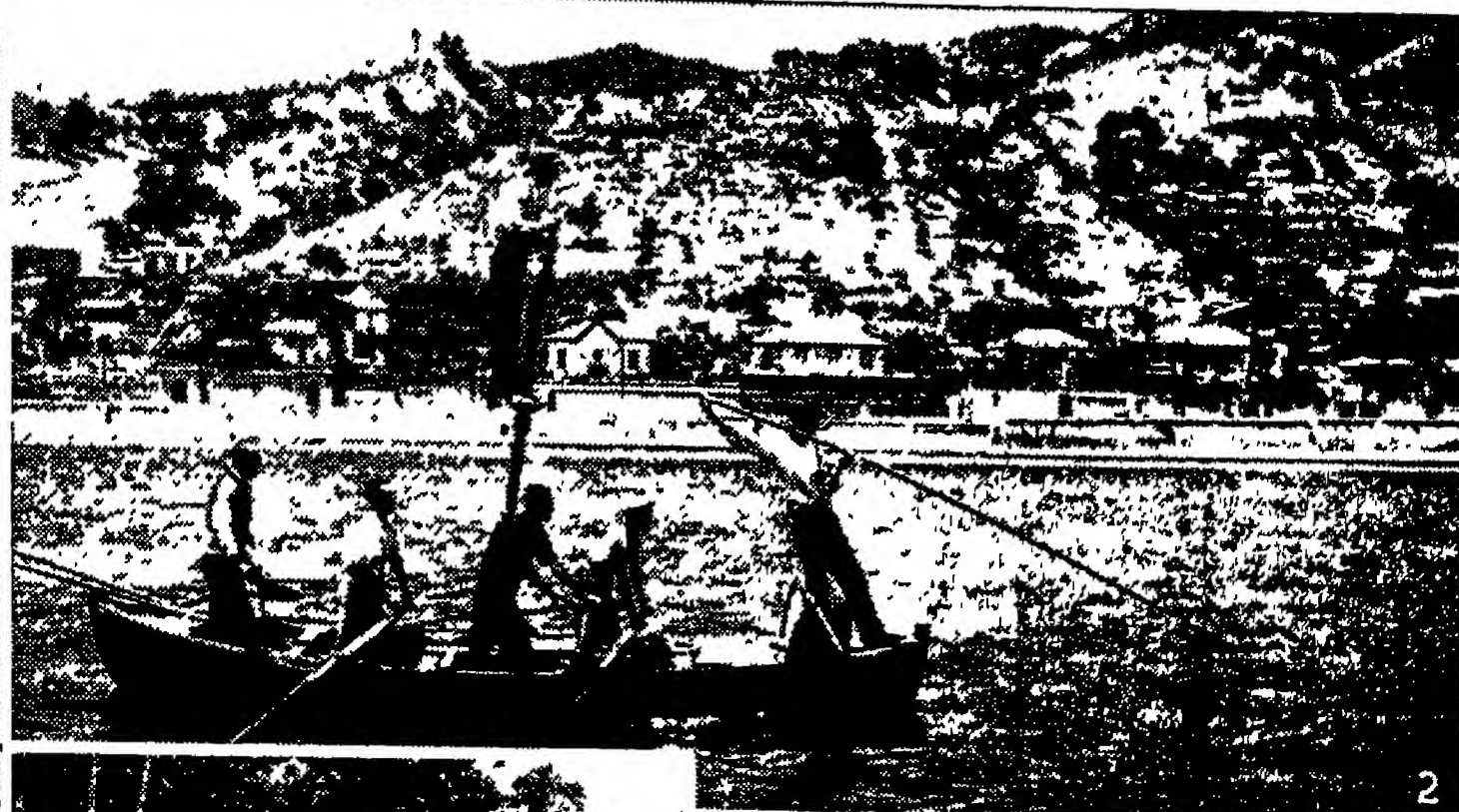
islands: 3,000 million cubic metres of methane were extracted in 1954 and distributed through a network of pipelines. Exploitation of petroleum in northern and central Italy and in Sicily and of natural gas revolutionised Italy's economic and industrial position.

Industry developed greatly after 1920 in every aspect of manufacture, from ship, motor car, and aeroplane building to the production of silk, textiles, and furniture. In the four years 1951-54 Italy's industrial output grew by more

than 43 p.c., and the purchasing power of the population was 25 p.c. greater in 1954 than in 1938. In 1953 Italy produced 3,423,000 tons of ingot steel, 1,222,300 tons of pig-iron. The biggest industries are nearly all in the N. Among minor industries are the glass of Murano and the lace of Burano, both in Venice, and the pottery of Florence and Rome. Food is canned in Naples; chief areas of wine production, almost all for home consumption, are Tuscany (Chianti), Piedmont, and Sicily.

Italy's trade is considerable, though low on a *per capita* basis. Imports normally exceed exports, the difference being covered in large part by shipping services, the tourist industry, and remittances from Italians abroad. Coffee, cotton, wool, crude petroleum, coal, foodstuffs, machinery, iron ore, and steel scrap are among imports.

In 1956 total rly. mileage was 13,660, of which 10,400 m. were state-owned (3,850 m. electrified). The roads exceed 100,000 m. in length, of which 15,400 m. are state



1. Boatman of Lake Como. 2. Fishing for swordfish in the straits of Messina. 3. Policeman outside the Palazzo Vecchio, Florence. 4. Bringing wine into Rome. 5. Women washing clothes in a stream at Rapallo, on the Riviera. 6. Going to market in Rome. 7. Bridge over the Volturno at Castelvoturno, Caserta. 8. Leading oxen out to plough fields in the country near Tivoli. 9. Peasant woman and mule at Perinaldo, Imperia

ITALY: TOWN AND COUNTRY TYPES AND SCENES

roads. Italy's seagoing merchant fleet in 1956 numbered 4,079 vessels of a total tonnage of 4,440,375 tons (compared with 667 vessels of 3,910,800 tons before the Second Great War). The chief ports are Naples, Genoa, Venice, Trieste, Savona, Spezia, Bari, Leghorn, and Messina.

CONSTITUTION. As a result of a special referendum held on June 2, 1946, Italy became, June 10, a republic. A constituent assembly, elected by proportional representation also on June 2, 1946, drafted a new constitution which came into force on Jan. 1, 1948. Under this constitution the legislative power rested with an elected chamber of deputies and an elected senate. A measure of administrative autonomy was granted to certain areas (Val d'Aosta, Trentino-Alto Adige, Sicily, Sardinia, Friuli-Venezia Giulia). The head of the state was a president elected for seven years.

Monarchy into Republic

From 1861 until the fascist revolution of 1923 (*v.i.* HISTORY), Italy was a limited monarchy, the king reigning without governing and sharing the legislative power with a parliament composed of an elective chamber and a senate consisting of princes of the blood and an unlimited number of others over 40 years of age who had qualified under any one of 21 categories. On Dec. 9, 1928, the fascist grand council was formed: it stood above parliament, and even above the crown, since it took upon itself the right of veto in regard to the succession to the throne. In 1938 the chamber of deputies was transformed into a chamber of corporations. Both the fascist and pre-fascist constitutions disappeared with the fall of Mussolini and the defeat of Italy by the Allies in 1943, during the Second Great War.

EDUCATION. The level of education is, on the whole, high, although illiteracy still exists, especially in the S. There are elementary, secondary, and high schools, universities and professional (agricultural, commercial, naval, industrial) and art schools. Education is state controlled throughout, and the curriculum is standardised for the whole country. A few private schools exist, but students must pass examinations at the state schools before they pass from one grade of school to another or to a university. Elementary education is free and compulsory from 6 to 14. Higher

schools charge low fees, and exemption from payment can be secured by needy or promising students. Of Italy's 21 universities, ten are entirely supported by the state.

COLONIAL EMPIRE. At the beginning of the Second Great War, the Italian empire included Eritrea, Somalia, Libya, Abyssinia, the Dodecanese (ceded to Greece under the peace treaty, 1947), and Albania (liberated in 1944). Abyssinia, reconquered by British Imperial forces, resumed its status as an independent state in 1941. Eritrea, Somalia, and Libya remained after the Second Great War under British military administration until Eritrea was made an autonomous prov. of Abyssinia, 1952; Libya was made independent, 1957; and Somalia was placed under Italian trusteeship, 1950, for 10 years.

HISTORY. During twelve centuries of Roman domination, Italy underwent a long phase of development, reflecting the glory and the decadence of the Roman state. Both before and under Rome, Italy was a conglomeration of different peoples, some of whom had attained a considerable cultural level. Among them were the Etruscans (whose writing has remained undeciphered); the peoples of Magna Graecia and Sicily who had absorbed, and retained, Greek culture; the Gauls of the Po basin and the Venetians of the N.E.

Rome succeeded in latinising the whole administratively, but not politically. The result was that Italy, which had, through Rome, created the Roman empire, was in the end the weakest member of it. With the end of the empire, Italy started a new phase of its history.

Barbarian Invasions

When, in the middle of the 5th century, Gaul and the Iberian peninsula fell under the occupation of Goths, Visigoths, and Franks, the Roman, or Western, empire survived only in Italy where it had been born. But during the course of that century the peninsula itself was invaded by barbarians, Rome being several times sacked by them. For more than a century the emperors held the throne under the protection of barbarians until Odoacer, who had come to Italy across the N.E. Alps, in 476 promised a distribution of land to the barbarian troops who had been in the Po valley for more than two generations, and was elected emperor, thus turning out of Ravenna Augustulus, last

of the Western Roman emperors. The year 476 marks both the advent of barbarian rule over Italy, and the restriction to the peninsula of the name Italy, the Italian prefecture having previously comprised also the African dependencies and those of Illyria on the Adriatic. Odoacer became king of Italy, with Sicily and Dalmatia.

End of the Gothic Reign

The effects of the invasion of Theodoric with his Ostrogoths, at the end of the century, went much deeper. Theodoric divided among the *hospites*, *i.e.* his troops, a third of the land, which he took from its native possessors; but the Goths kept for themselves only the profession of arms, and left civil administration to the Romans and Italians. This phase lasted until 553, when the war of imperial reconquest, which had been started twelve years before by the emperor Justinian, came to a successful end, the Gothic reign collapsed, and Italy became a province, but not the centre, of the Eastern Roman empire.

In 568 northern Italy was invaded by the Lombards, or Langobardi, who had already conquered the Danubian lands (mod. Hungary). Unlike the friendly Goths, the Lombards came into Italy as foes and conquerors. They advanced rapidly as far S. as Benevento, and Italy was divided into a loosely knit confederation of duchies, from Milan to Naples and Benevento, with Pavia as capital.

The peoples of Italy, meanwhile, were beginning to develop an autonomous political administration under the *suave jugum* (kindly rule) of the bishops, among whom the bishop of Rome soon took precedence: he was a spiritual chief whose position was strengthened by the support of the militias of Rome and Ravenna, and the ships of Venice. On the W. frontiers of the Lombard kingdom lay the Frankish kingdom. More than once Franks and Empire linked hands against the Lombard kingdom. It was natural, therefore, that the church should turn to them. Pope Gregorius III wrote to Charles Martel in 739. Charles did not answer. But his son Pepin the Short recovered the papal territories seized by the Lombards and gave them to the church. The pope crowned Pepin in Rome, and placed the territories acquired by the church under his protection. In this donation, 756, called the donation of Pepin, not in the apocryphal donation of Constan-

tine, the papal state was historically recognized. (It was to last until 1870.) The Lombard kingdom was finally routed by Pepin's son, Charlemagne.

In 774, with the Franks ruling in Italy in place of the Lombards (who left their name to the region ever since called Lombardy), Italy was effectively detached from the E., and the Roman church emerged as a paramount power in Europe.

Frankish Empire and Papacy

In S. Italy there still survived a remnant of Greek culture. Concurrently with this personal union between the Frankish kingdoms in France and in Italy, the peninsula was newly infiltrated by Frankish and German elements—Alemanni, Burgundians, Bavarians, etc.—who brought Italy into touch with Germany and the Anglo-Saxon countries. A new and vaster world opened to Italy, and it was a Western world. When Charlemagne re-created a great empire, his position in the eyes of the church was very great indeed, and solidarity between the new empire and the papacy developed. On Christmas Day of the year 800 this spiritual fusion with the new Western empire found expression in the crowning of Charlemagne as Roman emperor by Leo III before the altar of S. Peter in Rome.

At the death of Charlemagne in 814, Italy was a kingdom of Lombards under a Frankish dynasty, with a Roman republic in the papal territories. The Frankish domination of Italy came to an end in 887 when Charles the Fat was deposed. For the next sixty years or so, several Italian princes rivalled each other for the crown of Italy. Berengar of Friuli was successful for a time, but even he failed to control the whole kingdom. The growth of feudalism was undermining the basis for unified authority.

The first half of the 10th century saw the consolidation of the Church's prestige, and its emergence as an international power. In 951, Otto I, king of Germany, was called into Italy by Adelaide, widow of Lothair, king of Lotharingia (which included north Italy), who had taken refuge with the bishop of Reggio in N. Italy. Otto entered Pavia, the old capital, without a fight, married Adelaide, and took the title of king of Lombardy, assigning to his son Adalbert Lombardy less the margravates of Verona and Aquileia, which he gave to his brother Henry, duke of Bavaria and

Carinthia. There followed a short struggle between pope and emperor, which ended in the emperor's triumph, Italy changing into a German kingdom.

For Otto I, the city of his own heart was not Rome, but Aquisgrana (Aix-la-Chapelle), where Charlemagne, symbol of the new empire, was buried; and when Otto revived the empire in 962, it was Charlemagne's empire he had in mind. Rome had to submit to the empire, although the emperor recognized that Rome remained *caput mundi*. German influence increased all through the 10th century, and Otto III thought, at one time, of making Rome the seat of the empire once more. But in fact he, like his predecessors, governed Italy from Germany.

Widespread Risings

The 11th century brought revolt against this order, headed by the secular aristocracy. In 1001 there were insurrections in Rome, Tuscany, and Piedmont. These risings took on a national colour; they were called Roman, Italian risings against the foreigner. Arduino, marquess of Ivrea in Piedmont, was elected king of Italy by his peers at Pavia. But from Germany came Henry II, of the same Saxon family; he was well received in N. Italy, and the archbishop of Milan crowned him king, 1004. There was a revolt, and the king was obliged to flee. But he returned and confirmed the bishops in the temporal power that they had in the meantime been gaining. Italy was a fief of the empire, with the church holding the balance between the German emperor and the local dukes. Meanwhile in the south and in Sicily a strong Norman kingdom had taken shape, which in 1139 won the recognition of Pope Innocent II.

By the beginning of the 11th century, Pisa's ships were trading in the southern seas. Pisa and Genoa were extending their military and mercantile power over Liguria and Tuscany, an extension of power that was eventually to bind Corsica and Sardinia to the peninsula, and that, on the Adriatic, was soon to be rivalled by the power of Venice. Amalfi joined in the ranks of the foremost sea-powers, reaching the peak of its splendour about 1050. Salerno was another notable trading city.

This was also the period of the struggle over investiture (*q.v.*) between the austere and firebrand Pope Gregory VII and the Ger-

man emperor Henry IV. Such a disturbed situation was particularly favourable to local self-government; siding now with the pope, now with the emperor, several towns obtained concessions from both. The cities became units, their social and civic composition taking shape in new and independent forms. Wars broke out between cities, and alliances were formed among them. They had their own coins and currency; they constructed new and much enlarged walls, and built great and splendid cathedrals as centres not only of religion, but also of culture.

The evolution towards self-government and the organization of each town varied greatly in different parts of Italy; but everywhere a new spirit of enterprise developed which was soon to stimulate industry and trade and to lead to the rising of a new class—that of the merchants.

Rise of the City States

The records of Milan contain the first mention, 1098, of a *commune consilium*. The beginning of the next century saw the wider establishment of such communes, a form of political and economic organization remote from feudalism, essentially a voluntary association, and giving the citizen a part in the life of his city. Public and private law developed; the new bourgeoisie of *mercatores* (tradesmen) was recognized; the crafts organized themselves into protective guilds which often dominated the political life of the communes, or city-states. The cities became models of civic and cultural life.

While the former realm of the emperors was transforming itself into municipalities, and the S. was taking a monarchical form of its own, moral unity was growing, its most powerful elements being unity of religion and of culture. Also a new tongue called Romanic or *vulgaris* was becoming the spoken language of the peninsula, even permeating the degenerating Latin of official documents. A new Romanic—or Italian—architecture was flourishing in places as far apart and as different as Lombardy and Apulia. Roman law returned to life and became an object of study. There was a revival of interest in the monuments of the past; the Renaissance was carrying Italian culture all over Europe.

When in the second half of the 12th century, the Hohenstaufen

emperors tried to assert their authority over Italy, they found a powerful obstacle in the communes. Thus, Frederick I Barbarossa clashed with Milan and with the communes of the Lombard league which eventually defeated him at the battle of Legnano, 1176. Seven years later at the peace of Constance, he relinquished all but nominal rights of sovereignty over the confederate cities. The struggle was taken up by Henry VI, and even more forcefully by Frederick II, who for 30 years (1220-50) strove to secure the triumph of the imperial cause. His death in 1250 marked the end of the prestige of the empire in Italy. By then, economic prosperity, the result of the rapid development of manufacturing industries, trade, and banking, had raised several of the city-states to great power. This power was destined to increase during the next century, so that some of the Italian republics monopolised the international trade between the East and the West.

Guelphs and Ghibellines

Dominating the period was the rivalry of Guelphs and Ghibellines, of which Dante, himself a Guelph who later developed a leaning towards the idea of a universal empire, spoke with such bitterness in his *Divina Commedia*. This desperate struggle was for the ascendancy of papacy or empire over Italy. The republican cities and the duchies took sides, prompted most often by considerations of interest; and for more than two centuries feelings ran high. It was during those two and a half centuries that Italian art and culture touched their unsurpassed peak.

After 1250 the imperial cause was taken up in S. Italy by Manfred, acting as regent for the boy Conradin. Popes Innocent IV and Alexander IV continued to make headway against the Ghibelline party, which made itself odious by the massacre ordered by the tyrant of Padua, Ezzelino da Romano, himself killed in 1259. The Guelphs gained ground in Lombardy; but the Ghibellines in Tuscany recovered after the battle of Montaperti, 1260, which placed Florence in their power. At this, Pope Urban IV (d. 1264) invited Charles of Anjou, brother of the king of France, to Italy, to command the Guelphs, and be crowned king of Sicily. Charles accepted, receiving the support of pope Clement IV when he suc-

ceeded Urban, and defeated and killed Manfred at the battle of Benevento, 1266. When Conradin, a boy of 16, came from Germany in 1267 to claim the succession, he was defeated by Charles at Tagliacozzo, 1268, captured, and beheaded at Naples.

The Sicilian Vespers

The pope was thus victorious; but Charles of Anjou had achieved a power in Italy which excited the pope's jealousy. A Sicilian rising against the French began with the massacre of March 30, 1282, called the Sicilian Vespers, and the Norman line was restored through the house of Aragon, Manfred's daughter having married Don Pedro, king of Aragon. The Angevins continued to reign at Naples. The new emperor, Rudolf of Hapsburg, thought it wise to make a deal with the popes, and by a charter of 1278 confirmed the papal sovereignty over Emilia, Romagna, the mark of Ancona, the old patrimony of S. Peter, and the campaign of Rome. Guelph and Ghibelline towns existed side by side in Italy: but the Mediterranean Sea remained a field for the rivalry of Genoa and Venice. Pisa having been defeated in 1284 by Genoa.

Towards the end of the 13th century Pope Boniface VIII, having failed in his bid to extend his domination to Tuscany (though he did succeed in replacing the party in power in Florence—the White Guelphs—by a rival faction, the Black Guelphs), failed also in the more ambitious attempt to assert the supremacy of spiritual power over the temporal. He was thwarted by the king of France, impatient of papal interference. It was in this period of continuous strife that, after the election of a Frenchman as Clement V, the popes moved in 1309 to Avignon, coming thus under the influence of the French kings and losing their authority in Italy. In 1309 Robert of Anjou, grandson of Charles, became king of Naples and leader of the Guelphs. Henry VII of Luxemburg entered Italy in 1310 in order to claim the authority of emperor of all men, was crowned at Rome, but died at Buonconvento, near Siena, in 1313. Dante's lofty dream had proved to be impracticable. Henry's death was followed by great confusion and rivalries between local potentates in central and N. Italy.

The middle of the 14th century saw the advent of mercenary armies, companies of adventurers

who sold their services to the highest bidder. At first composed for the most part of foreigners, such bands later consisted mainly of Italian soldiers. Francesco Sforza and Giovanni de' Medici were notable captains of companies of mercenaries.

During 1309-1417, when the papacy was re-established firmly and without dispute in Rome by Martin V, the Italians attained, albeit amidst much confusion and strife, a greater measure of self-government than ever before. By the middle of the 15th century Italy was divided into five principal states—the kingdom of Naples, the duchy of Milan, the republics of Florence and Venice, and the papacy. The conflict between Guelphs and Ghibellines had become substantially a social conflict between the new civic and the old feudal institutions, the new commercial and the old military interests, the Guelph representing democracy and industry, the Ghibelline the aristocracy of the old order. Some of the "tyrants" grew stronger and more famous, but on the whole the victory was with the plebeians, the older noble families dying out and new houses rising to importance.

New Noble Houses

The Visconti made themselves supreme in Lombardy, Giangaleazzo Visconti in 1395 paying the emperor Wenceslaus 100,000 gold crowns to recognize him as independent and create him duke of Milan. They were succeeded in 1450 by the Sforzas, the great condottiere Francesco Sforza, an advocate of a federated Italy, proving an able ruler.

In Florence the Medici, supported by the common people from whom they had sprung, achieved political power through wise use of their riches. Lorenzo the Magnificent, whose political skill secured for a brief fourteen years a delicately poised balance of power in Italy and achieved peace in the peninsula, made his city also a centre of the new culture.

The Venetian republic emerged successfully from a terrible struggle with Genoa for the lucrative Levant trade; in 50 years, chiefly under the Doge Francesco Foscari and with the aid of great condottieri like the Gattamelata, Francesco Sforza, and Bartolomeo Colleoni, it annexed eleven provinces on the mainland.

The 15th century was a period of social construction upon an unstable base continuously shaken



by wars, and a period of marvellous cultural development. The spirit of the age was utterly materialistic. The *Rinascimento*, artistically, culturally, and socially, was the assertion of the personality of the individual in all spheres of life. The republics, the states, the duchies, vied with one another in an effort to become seats of culture, to secure the services of the greatest and most celebrated artists. This was the period of humanism, that is, of the re-discovery of the ancient world and of the effort to recapture its spirit; of unsurpassed artistry in painting and sculpture; and of scientific progress. Italian universities attained great fame and Italian culture permeated the whole of Europe.

The Momentous Year 1492

In 1492 Lorenzo de' Medici, the Magnificent, lord of Florence, died; Columbus discovered America—thus impairing the commercial supremacy of Venice; Rodrigo Borgia was elected pope as Alexander VI. And in the peninsula the stage was set for the disintegration of Italy. Spain, France, Germany had been summoned into the country to protect the small domains of local princelings or states.

In Sept., 1494, the invasion began with the crossing of the Alps by Charles VIII of France. Without opposition, Charles, welcomed by Savonarola as the messenger of God, crossed Lombardy and Tuscany, where he saw the Medici expelled, and reached Naples, where he was crowned. But the pope and Lodovico Sforza were against him, and he soon had to retrace his steps. In 1498 Savonarola was put to death for heresy on the instigation of Pope Alexander VI; in the same year Charles VIII died and was succeeded by Louis XII who, claiming the duchy of Milan through his grandmother Valentina, daughter of Giangaleazzo Visconti, seized the city in 1499. Lodovico died a prisoner in France in 1508. In 1504, Ferdinand V of Spain ousted Louis XII from Naples.

Meanwhile Cesare Borgia seized Romagna, with the help of his father, Alexander VI, and was planning to enlarge greatly his domains, when the pope died, and was succeeded by Julius II, a soldierly pope who acquired Emilia and set himself to reduce the power of the local tyrants. He allied himself with the Spaniards against the French, but succeeded only in giving Italy a new foreign

master. The fight between French and Spaniards in Lombardy was long; but eventually at the battle of Pavia, 1525, Francis I of France was taken prisoner, and Italy was at the mercy of the Spaniards, who sacked Rome in 1527.

When Emmanuel Philibert succeeded his father as duke of Savoy in 1553 he had no dukedom, but he took service with his cousin Philip II, and after the treaty of Cateau Cambresis, 1559, and the retirement from Piedmont of both Spaniards and French in 1574, he regained his estate, moved his capital from Chambéry beyond the Alps to Turin, and became an Italian prince.

Decline of the Great Cities

During the whole of the 17th century, Spain ruled over S. Italy; and Milan, a key-area in N. Italy, was the paramount power in the peninsula. It was a century of decline even for the various independent states, the great seafaring republics such as Venice and Genoa, and the trading cities such as Florence, owing to the shifting of the international trade routes and the consequent decrease in Italian prosperity.

Several of the ancient ducal families in central Italy died out, and the popes settled their domains upon their own relatives. During the dynastic wars of Spanish, Austrian, and Polish successions, Italy changed masters with indifference. The French armies of Louis XIV were defeated by Prince Eugene of Savoy, who in 1707 expelled them from Italy; and by the treaty of Utrecht, 1713, Victor Amadeus II of Savoy was made king of Sicily (a territory he was forced to exchange for Sardinia in 1720). Charles of Austria acquired Milan, Mantua, Naples, and Sardinia. Thus began the Austrian domination in Italy.

By the treaty of Vienna, 1738, which ended the war of the Polish succession, the Two Sicilies were given to the Spanish Bourbon, Don Carlos, and Tuscany was given to Francis of Lorraine, husband of Maria Theresa. From that date until Napoleon's invasion of 1796, Italy was at peace. Most of the Italian and foreign princes ruling over the various states embarked upon modest but progressive plans of reform; and in Lombardy agriculture, education, and order improved under Austrian rule.

Italy was hostile to and alarmed over the French revolution, and Bonaparte turned his attention to

the country almost as soon as he was given command of the so-called army of Italy. He defeated the king of Sardinia and obliged him to hand over Savoy and Nice; soon afterwards he defeated the Austrians and signed with them the treaty of Campoformio, 1797, by which Austria gave up Lombardy and received in return the republic of Venice, which had surrendered to Bonaparte almost without a fight—an inglorious end to a glorious existence of eleven centuries. The cession of Venice by Bonaparte to Austria aroused indignation in Italy.

Extension of French Rule

After the French occupation of Lombardy (the Cisalpine republic), political movements began all over Italy, whereby Bonaparte was able to extend the Cisalpine republic to include the duchy of Modena and the Ligurian republic (capital, Genoa), and to compel Charles Emmanuel IV of Savoy to give up Piedmont to France, 1798. In the same year the temporal power of the popes was overthrown and a Roman republic proclaimed; Naples surrendered and was made capital of the Par-

thenopacan republic. In 1799 the Bourbon king of Naples was put to flight, and the French took over the duchy of Tuscany. Thus at the end of 1799, with the exception of Venice assigned to Austria, Sardinia still left to the Savoy, and Sicily, where King Ferdinand of Naples had taken shelter under British protection, the whole of Italy was under French rule. The pope, Pius VI, died in French captivity at Valence, 1799.

The French were defeated repeatedly in 1799 by the Austro-Russian army under Suvarov, and forced to evacuate Naples and central Italy. Even in N. Italy, the French lost ground. But Bonaparte, back from Egypt, won back at Marengo, 1800, all that had been lost; and, after his proclamation as emperor in 1804, ignoring his undertaking in the treaty of Lunéville, 1801, to respect the Ligurian and Cisalpine republics, Napoleon made himself king of Italy, placing the iron crown of the old Lombard kings upon his own head in Milan cathedral, May 26, 1805. Immediately after, he proceeded to split Italy into a number of princedoms, with his relatives as princelings. He appointed his

stepson Eugène Beauharnais as viceroy of a kingdom of Italy which consisted of most of N. Italy; the republic of Lucca with Piombino he gave to his sister Marianne Elise and her husband Prince Bacciocchi; in June, 1805, he declared Genoa part of the French empire; in 1806 he sent his brother Joseph to Naples, where he was proclaimed king (replaced in 1808 by Murat, Joseph being transferred to Madrid as king of Spain). Napoleon annexed the papal states in 1809; the pope, Pius VII, excommunicated him, only to be arrested and carried to Fontainebleau, to be held a prisoner until 1814.

Years of Prosperity under Napoleon

The years 1809–12 were years of prosperity for Italy. Milan became an important centre in the national life, and the N. acquired a predominant influence upon political thought and the national conscience. The northern kingdom created by Napoleon fused into one peoples who until then had been divided by political and economic barriers; and gave them a sense of the necessity of bringing the other parts of Italy into a unity. The new French institutions, the introduction of the *Code Napoléon*, and the contacts with trans-Alpine countries produced by trade brought a whiff of fresh air into the musty atmosphere.

The congress of Vienna, 1815, restored to Italy its pre-Napoleonic boundaries except that Austria retained Venice in addition to Lombardy, Friuli, Istria, and Dalmatia, besides having a right to keep garrisons in several duchies granted to vassals of the house of Hapsburg. Italy was ripe for the *Risorgimento*, which had one main object: liberation from Austria.

The social classes that worked in and for the *Risorgimento* were the aristocracy to which the Napoleonic wars and the new intellectual evolution of Europe had given a national conscience; the upper middle classes and the bourgeoisie which had recently been admitted to the army and public offices. The masses of the people took but a lukewarm part in the movement—after the turmoil of Napoleon's wars, they appeared content to accept a foreign despotism that gave them peace and protected religion. A group which proved, at the outset, a channel for the fusion of isolated tendencies was the secret organization of the Carbonari. This society, a kind of freemasonry, had



Italy. The political divisions of the country as they existed from 1815 to the unification, which was carried out during 1860–70

a vague programme of replacement of despotism with constitutional government, and of foreign with national rule.

Local insurrections began to take place, fomented and organized by the Carbonari. The first was the revolt of Naples, 1820, under General Guglielmo Pepe, which forced the king to grant a constitution, soon revoked, for the Austrians entered Naples in March of the following year and remained there until 1827. But while the Austrians were entering Naples, a revolt broke out in Piedmont, supported by the heir to the throne, Prince Charles Albert. Acting as regent for the absent king, Prince Charles Felix granted a constitution, promptly suppressed by the king. This revolt was, likewise, quelled with Austrian help. As a result of plots in Lombardy, the poet Silvio Pellico and others suffered years of imprisonment in the Spielberg fortress: Pellico's *Le Mie Prigioni* excited sympathy all over Europe for his cause.

"Young Italy"

In 1831 further scattered revolts occurred. The patriots were crushed, but they found a prophet in Giuseppe Mazzini, founder of Young Italy (*Giovine Italia*), an association which powerfully contributed to make Italians familiar with the idea of a united Italy. Mazzini advocated the foundation of a unified republic; others preferred a monarchy. Vincenzo Gioberti in his *Primato Morale e Civile degli Italiani*, 1843, put forward still another suggestion—a federation of Italian states under the presidency of the pope.

The Risorgimento took definite shape in 1848. Under pressure from public opinion King Charles Albert of Sardinia drew up a draft constitution on March 4, 1848, providing for a nominated senate and an elected chamber of deputies, the abolition of press censorship, freedom of speech and of meeting. Other Italian states (including the pope's) granted similar constitutions at about the same time. On March 22, the five days' revolution in Milan ended in the withdrawal of the Austrians from the city after violent fighting; next day the king declared war on Austria, in the hope of freeing Lombardy and Venice, only to be defeated after some preliminary success; and on Aug. 6 Radetzky re-entered Milan. Revolt broke out also in the papal states, and pope Pius IX, who in the two previous years had raised the hopes

of Italian liberals only to disappoint them, fled from Rome, where in Feb., 1849, a republic was proclaimed, Mazzini becoming head of a triumvirate. In Piedmont, the king again took up arms against Austria, aware that his action was desperate, but that a refusal to go to war would cost him the support of those who sought independence. On March 23, 1849, Radetzky defeated the Piedmontese army at Novara. The same night King Charles Albert abdicated in favour of his son Victor Emmanuel II, and went into exile, dying at Oporto four months later. Rome, after a heroic resistance led by Mazzini and Garibaldi, succumbed at length to preponderant French forces; and Venice similarly yielded to the Austrians after a long struggle.

The period of the revolutions had failed to bring about unification; ten years were to elapse before hopes rose again.

But that decade was a fruitful period of preparation, politically and diplomatically; its guiding spirit was Cavour. In 1850 Cavour entered the Piedmontese cabinet as minister of agriculture and trade; in 1852 he became prime minister, and until July, 1859, he held the reins of government in that small state, and was one of the protagonists of the unification of Italy. He saw that the forces of Austria and her vassals could not be defeated without skilful diplomatic action intended to win the support of the great powers.

Piedmontese Help in the Crimea

The Crimean war gave Cavour his chance. Taking advantage of Austria's error in displeasing Great Britain and France, he allied Piedmont with them, Jan., 1855, and contributed to the Crimean expedition a force of 15,000 men, which fought most gallantly. At the congress of Paris, Feb., 1856, Cavour out-manoeuvred Austria and took the opportunity of bringing forward the Italian question as of general interest to the peace of Europe. He secured the sympathy of Great Britain; and shortly afterwards succeeded in concluding an alliance with Napoleon III.

The speech from the throne in Turin, Jan., 1859, was a clarion call to Italians. On April 23, Austria sent an ultimatum to Piedmont to disarm; Cavour's patient and able diplomacy was bearing the desired fruits; six days later war began between Austria and the joint forces of Piedmont and France commanded in person by Victor

Emmanuel II and Napoleon III. On June 4 the allies' victory of Magenta freed Lombardy, and four days later Victor Emmanuel and Napoleon entered Milan. At the same moment Garibaldi was freeing Como and had reached Brescia. But Napoleon III decided, without the king's knowledge, to ask for an armistice, and the chance of liberating Venice faded. Against Cavour's advice, Victor Emmanuel accepted the peace terms proposed, and Cavour resigned, to return to office in Jan., 1860, when he exploited for the purposes of unification the risings that had taken place in central Italy. He agreed to the cession of Savoy and Nice to France as a reward for her help in freeing Lombardy; Tuscany, Emilia, and Romagna were formally annexed to the new kingdom of Italy. A parliament including representatives from central Italy met at Turin in April, 1860.

Garibaldi's Thousand

Meantime, Garibaldi was preparing an expeditionary corps with the purpose of moving northwards from the extreme south; on May 5 he left Quarto, near Genoa, by sea with Nino Bixio and a thousand volunteers. Cavour had his doubts about the expedition, sympathising with its aim, yet fearing that the radical (Mazzinian) views of Garibaldi and his followers might prevail over the liberal (moderate) principles he cherished. Garibaldi landed at Marsala on the 11th, under the protection of British frigates; and on the 26th reached Palermo, proclaiming himself dictator of Sicily in King Victor Emmanuel's name. In Aug., in spite of protests by the powers, Garibaldi crossed the straits and began to march on Naples. King Francis of Naples sailed for Gaeta on Sept. 6, and next day Garibaldi entered Naples.

Cavour, in spite of French misgivings, decided that Piedmont must take part in the liberation of the south. He therefore sent Piedmontese troops to occupy Umbria and the Marches and put themselves between Rome and the Garibaldian legions. This was one of the boldest moves of Cavour's memorable political career. Thus the Piedmontese crossed the papal frontier; and by Oct. 15 they were in Neapolitan territory. On Nov. 7 King Victor Emmanuel reached Naples. Garibaldi gave up his dictatorship and, his suggestion that he should be made viceroy of Naples for life having been refused, he declined

other honours and returned to his farm on the island of Caprera.

On Feb. 18, 1861, King Victor Emmanuel II was proclaimed king of Italy at Turin, by the first parliament representing all Italy. Cavour, who held that Italy would not be fully united until Rome was free and capital of the country, died in June. The difficult work of unifying administratively and economically districts which had had a separate development for long centuries was left to other less skilled hands. An attempt by Garibaldi in 1862 to seize Rome, where the French maintained the pope in power, was frustrated. In Sept., 1864, the capital of Italy was moved from Turin to Florence.

Alliance with Prussia in the war of 1866 against Austria gave Italy Venice, Oct., 1866, but only part of the Venetian provinces, for Bismarck allowed Austria to retain Trentino and South Tirol as well as Venezia Giulia with Trieste and all Istria. This led to the formation of an irredentist movement, aimed at securing the union of all Italian-speaking lands, and a potent force in Italian politics for many years.

Unification Completed

Garibaldi made another attempt upon Rome in Nov., 1867, but was obliged to yield to the French and papal armies at Mentana. But the declaration by France of war against Prussia in July, 1870, forced the French to evacuate Rome; whereupon public opinion compelled the Italian government to act. On Sept. 20 the Italians attacked. When they had breached the walls at Porta Pia, the pope ordered the garrison to cease fire, and the Italians occupied the city. Twelve days later, a plebiscite gave 133,681 votes for union with the kingdom of Italy, 1,507 against it. The unification of Italy was complete.

On Jan. 9, 1878, Victor Emmanuel II, the king who had made Italy, died, and was succeeded by his son Humbert (Umberto) I. The right wing government which successfully carried out Cavour's policies during 1861-76, weakened by internal dissension and unpopular through its strict fiscal policy and administration, had given place to a left wing administration under Depretis, who promised an extension of the suffrage, free education, relief from taxation, greater liberties. But the left found Italy internationally isolated; and soon Italian colonial ambitions brought the country into conflict with France, which seized Tunis in

1881. Depretis began negotiations with Germany and Austria, already bound to one another by an alliance. On May 20, 1882, the triple alliance was formed, to be renewed in 1887, 1891, 1902, and 1912: an alliance viewed by many Italians with misgivings, since it implied a renunciation of claims to Trentino and Trieste.

Internal Reforms

The government now set about bringing order into internal affairs. The treasury resumed payment in gold. The state rlys. were handed over to the management of three private companies (the state resumed possession in 1905); and a new assessment of land tax was introduced. The mercantile marine began to develop; and a movement to improve public health resulted from the cholera epidemic of 1884. Education was made compulsory in 1877; in 1882 those entitled to vote increased from 600,000 to 2,500,000; progressive reforms took place in provincial and municipal administration, and the excellent Zanardelli code of law was introduced.

Italy's colonial development began when, on Nov. 15, 1869, an Italian shipbuilder named Rubattino bought the bay of Assab from the sultan of Raheita with government backing. In Sept., 1881, the sultan accepted Italian protection. In Feb., 1885, Italy occupied Massawa, with British approval—an event which led to a clash with Abyssinia. In Jan., 1887, a small Italian force was wiped out at Dogali, except for one survivor.

A truce of some years ensued after Menelik, the negus, signed a treaty with Italy at Ucciali, recognizing Italian rights in the area subsequently named Eritrea. But in May, 1893, Menelik denounced the treaty of Ucciali, and in 1895 the war flared up, culminating in a heavy Italian defeat at Adowa, March 1, 1896. For several years thereafter Italy confined herself to the agricultural development of the colony of Eritrea.

At home, Depretis, who became prime minister in 1876, inaugurated the policy called *trasformismo*, which consisted in governing not according to a political creed or with the support of one party, but through the personal allegiance of a sufficient number of deputies, whatever party they belonged to, to the prime minister. Thus the basis itself of parliamentary life was wrecked. This policy was pursued by Depretis' successors, notably by Crispi, who

had been one of Garibaldi's closest collaborators, and who tried to infuse energy into Italian internal and international politics during his periods of premiership, 1887-1891, 1893-1896. Crispi was brought down by the disaster of Adowa. On July 29, 1900, King Humbert was assassinated by an anarchist.

The first ten years of the reign of his son, Victor Emmanuel III, were difficult internally. Economic problems and strikes were accompanied by the rapid development of the socialist movement, which began to divide, in Italy as elsewhere, into a revolutionary section advocating uncompromising class warfare, and a moderate reforming wing. Later, a third section, the syndicalists, who opposed all legislative action, was formed. In the same period a parliamentarian of great abilities came to the front, Giovanni Giolitti, whose administration of more than a decade was on the whole progressive.

The economic capacity of the country expanded; the Simplon tunnel was made; the rlys. were extended; shipping was developed (Genoa becoming the second Mediterranean port). Political life was democratic-liberal, based on social amelioration.

War with Turkey, 1911-12

The first outward sign of national revival was the Turkish war of 1911. Its object was to wipe out the ignominy of the Adowa defeat. Diplomatic exchanges were followed by an ultimatum to Turkey, Sept. 28, 1911, and war was declared next day. Public opinion was on the whole favourable. Italy annexed Tripolitania and Cyrenaica, Nov. 5; and in the treaty signed at Lausanne on Oct. 18, 1912, she remained in possession also of Rhodes and the Dodecanese.

A new electoral law in 1912 increased the number of voters from 3,000,000 to 8,000,000, and in the elections of the following year the Socialists secured 79 seats, and a new Catholic party 33. In March, 1914, Giolitti resigned. He was succeeded by the liberal Salandra.

Outbreak of war in Aug. caused controversy in Italy. While the Socialists clamoured for neutrality, the nationalists, at first, were for war on the side of the central empires. But the government declared its neutrality on Aug. 3, on the grounds that Austria had failed to consult Italy before going to war; that Italy had been given no opportunity to mediate; and that the terms of the triple alliance did

not bind Italy to share in aggression. Soon those who favoured neutrality found themselves opposed by powerful groups which favoured intervention on the side of the Allies: their chief argument being that here was a likely opportunity to wrest *Italia irredenta* from Austria. It was at this stage that Benito Mussolini, till then editor of the Socialist organ *Avanti*, dramatically left the Socialist ranks, resigned his editorship, and, seeing a chance of gaining the limelight, founded the *Popolo d'Italia* in which he demanded intervention in the war.

Italy joins the Allies, 1915

Early in 1915 passions between those who favoured neutrality and those who favoured intervention were reaching a climax. Prince Bülow, sent from Berlin to Rome, tried to persuade Italy to remain neutral; but as Austria-Hungary still refused Italian demands for S. Tirol, Venezia Giulia, and the recognition of Trieste as a free city, Baron Sonnino, the Italian foreign minister, submitted to London a memorandum containing Italy's conditions for participation in the war on the side of the Allies. On April 26, 1915, the secret treaty of London was signed by Italy, Great Britain, France, and Russia. On May 3 Italy denounced the triple alliance; there followed days of intense patriotic fervour. On May 20 the Salandra cabinet received a vote of confidence in parliament of 407 to 74; and on May 23 Italy declared war against Austria-Hungary. General Cadorna was appointed c.-in-c.

Defeats in S. Tirol and on the Asiago plateau, May, 1916, led the government to resign, and the veteran Paolo Boselli formed a coalition government, retaining Sonnino as foreign minister. On Aug. 27, 1916, Italy declared war on Germany. But 1917 saw a serious increase in popular dissatisfaction, both at home and in the army. In Oct. the Italian front was penetrated at Caporetto. This defeat brought the enemy on to Italian soil; but by Nov. 22 the army was holding on the Asiago-Grappa-Piave front. Cadorna was succeeded by General Diaz; Boselli by Orlando.

In June, 1918, the Austrians attacked and were repulsed on the Asiago-Piave front; four months later Diaz launched a great attack along the whole front which destroyed the Austro-Hungarian army. An armistice, effective on Nov. 4, was signed at Villa Giusti

near Padua; one week later came the Allies' armistice with Germany.

Victory was followed by a great wave of frustration. The country was worn out after its prolonged effort. In Feb., 1919, Italy put her territorial claims to the peace conference. In addition to those set out in the treaty of 1915, she asked for Fiume. On April 23, 1919, without consulting the Italian govt., President Wilson published his appeal to the Italian people explaining why he opposed the Italian nationalists' claims in the Adriatic sector. On June 28, 1919, Italy was a signatory to the peace treaty with Germany.

Meanwhile, internal difficulties were increasing. In Jan. the Partito Popolare (People's Party), Christian-socialist in character, was formed under the leadership of Don Luigi Sturzo. Labour troubles, in industry and in the public services, multiplied.

On Sept. 10, 1919, peace with Austria was signed at St. Germain-en-Laye. Italy secured the frontiers assigned to her by the treaty of London on the N. and N.E.; but not Fiume.

D'Annunzio in Fiume

On Sept. 12 D'Annunzio, the poet, with a band of nationalists, ex-officers, and adolescents cheated of war adventures, occupied the town of Fiume and flouted for 15 months the Italian government and the Great Powers. The picturesque pageant of D'Annunzio's dictatorship came to an end when he was ousted by Italian troops in Dec., 1920.

Under the Rapallo treaty of Nov. 12, 1920, between Italy and the kingdom of the Serbs, Croats, and Slovenes (later Yugoslavia), Italy received Istria W. of the watershed, and the islands of Cherso (Cres) and Lussino (Losinj). Both countries recognized the independence of Fiume but later Mussolini decided to disregard this arrangement and Fiume was annexed to Italy.

In Italy, labour disturbances and outbreaks of violence by fascist squads kept the country in a state of unrest. The recently founded fascist party, which had obtained no seats at the Nov., 1919, elections, secured only 35 out of the 535 when a new parliament was elected in May, 1921. The last prime minister before fascism was Facta (March-Oct. 1922), an inept and colourless man. His incompetence, together with disunity in the Socialist camp, paved the way for Mussolini. This

ruthless and unscrupulous politician had often changed his allegiance in his lust for power. He saw his chance in the weakened state of Italy during the immediate post-war years, and did his best to stir up trouble and add to the confusion of an already confused situation. When, towards the end of Oct., he threatened to resort to force on an even larger scale, Facta resigned, and the king declined to sign a decree proclaiming martial law. On Oct. 30 Mussolini was offered the premiership by the king and on the next day his Black Shirts entered the capital to create the legend of a march on Rome.

Mussolini achieves Power

At first Mussolini formed a coalition cabinet. A fascist militia was promptly created which provided the regime with an ever-growing army of its own. The country was restored to a semblance of order. At elections held in April, 1924, fascism, which had absorbed the nationalists, was returned with an absolute majority. Parliament assembled in May. A fortnight later, June 10, a Socialist deputy, Matteotti, who was the ablest and most outspoken mouth-piece of the opposition, was kidnapped and murdered, his body being found later some 10 m. from Rome. Mussolini's responsibility became apparent. Four leading fascists were involved: they were arrested, but were acquitted. Both at home and abroad the case aroused violent criticism, and was a serious setback in Italy to the fascist government. But Mussolini muzzled the opposition press under a decree of 1924 empowering local prefects to seize newspapers in which seditious matter appeared; and in March, 1926, the principal national newspapers were forcibly acquired by pro-fascist groups. Political organisations and political parties other than the fascist one were dissolved; opposition was declared to be illegal, and active opponents of fascism were persecuted; laws "for the protection of the state," and increased penalties for various offences were enforced in 1927. On Sept. 19, 1928, the fascist grand council assumed the right of veto on all matters affecting the constitution, the prerogative of the crown, and the succession to the throne.

Tolerance, and even approval, for Mussolini's iron rule was the consequence of his apparent success in foreign affairs. In Aug., 1923, an Italian general and four

of his staff on the Allied commission delimiting the Greco-Albanian frontier were murdered by Greeks. When Greece refused to pay an indemnity, an Italian fleet was sent to occupy Corfu. A conference of ambassadors of the four Great Powers decreed that Greece should pay the indemnity. This success of a "strong" policy after so many discomfitures due to weak governments pleased the people.

Concordat with the Pope

In 1924 the U.K. ceded part of Jubaland (E. Africa) to Italy; and in 1926 Mussolini made a pact of friendship with Albania, as a counter-balance to the intimacy developing between the Serbs and France. The Lateran treaty with the holy see, Feb., 1929, and its accompanying concordat in regard to religion in Italy, created friendly relations with the Vatican, and, by recognizing the Vatican city as a state, gave a sense of deep satisfaction to R.C.s throughout the world.

Mussolini's economic and financial policies were dictated by political motives. Prestige was often the main consideration (e.g. for the disastrous policy of the revaluation, 1926-27, of the lira), or the propaganda value of certain measures (e.g. for the reclamation of the Pontine marshes).

The much-boasted achievements of fascism in agricultural development, public building, trade promotion were such as could be expected in any contemporary state. The corporative state, Mussolini's plan to harness the national economy and to end the strife between capital and labour, proved to be nothing but a hybrid and unworkable system. Art and literature declined in an atmosphere that stifled free expression. Above all, liberty and democracy were suppressed, and all vital decisions were subordinated to the whims and moods of one man. The deafening din of propaganda tried to hide the essential inefficiency of the fascist regime which was revealed to the world during the ordeal of the Second Great War. Up till then Mussolini's bluff had been successful.

At the end of 1934 a convenient frontier incident provided Mussolini with a grievance against Abyssinia, whose ruler appealed to the League of Nations. In April, the prime ministers of Great Britain and France met Mussolini at Stresa to discuss the German situation; the Abyssinian question was

not discussed, and Mussolini in the meantime went ahead with war preparations until in Oct., 1935, when the attack was launched, 250,000 men were under arms in E. Africa. Italy occupied Adigrat on Oct. 5, Adowa on the 6th. On the 7th the council of the League declared unanimously that Italy had resorted to war in disregard of its covenants, and 50 out of the 54 nations represented decided on the imposition of sanctions against Italy which, meanwhile, was pressing forward with the war. (For its course, see Abyssinia.)

At home, sanctions had the effect of rallying support for Mussolini, and the war gained in popularity when it became clear that it was not going to be a long one.

Sanctions were, in fact, never effectively applied; and on May 5, 1936, after the capture of Addis Ababa, the Abyssinian capital, Mussolini proclaimed Victor Emmanuel ruler of Abyssinia and emperor of Ethiopia.

Rome-Berlin Axis

Fascist Italy was now definitely opposed to the Western democracies. Germany seized the occasion to make warm overtures, and the Rome-Berlin Axis was formed, Oct. 25, 1936. Open intervention by Italy and Germany in the Spanish civil war followed.

That intervention left Italy's treasury empty and its military reserves depleted. In Sept., 1937, Mussolini paid a state visit to Berlin; in April, 1938, the visit was returned by Hitler. Germany's influence over Italy became more marked. In Sept., 1938, the British prime minister, Neville Chamberlain, who had already embarked on a policy of conciliation towards Italy, appealed to Mussolini to intervene with Hitler to spare Europe the calamity of a war. Mussolini, who desired nothing better than to place London and Paris under a personal obligation to him, arranged the meeting at Munich (see Munich Agreement).

In Jan., 1939, Chamberlain paid a state visit to Rome, and a fresh Anglo-Italian agreement recognized the Abyssinian empire. On Good Friday, Mussolini seized Albania, with nothing more than a murmur from the Western powers; and on May 22, Italy signed a treaty of alliance with Germany.

Yet when in Sept. war broke out, Mussolini proclaimed Italy a non-belligerent. Nobody wanted war, and he therefore enjoyed a wave of much-needed popularity. After the German invasion of

Norway, Mussolini was convinced that Great Britain's naval power was broken for good; and when France was on the eve of capitulation, thinking that delay would leave Italy outside the victor's camp, on June 10 he declared war on Great Britain and France. With that declaration of war Mussolini sealed the fate of himself, his regime, and Italy.

At no time was the war favourable to Italy; even on the French frontier, where the fighting was limited to a few days, the French territory occupied by Italy was gradually curtailed to suit the policy of the stronger German occupier. On Oct. 28, 1940, Mussolini attacked Greece, a catastrophic campaign which caused the resignation of Marshal Badoglio as chief of the general staff.

In Dec., 1940, a British offensive in Egypt routed the Italian army and compelled it to retreat as far as Tobruk. Earlier the Italian navy had been crippled by a successful air attack on the Taranto naval base. The war in N. Africa became a seesaw of alternating fortunes until in the spring of 1942 Italian and German forces advanced so far as to threaten Alexandria. The battle of Alamein reversed the trend of the campaign, which ended in May, 1943, with the Allied liberation of Tunisia. The Italian territories in E. Africa, including Abyssinia, were occupied by the British during 1941. At sea the Italian fleet lost three cruisers and two destroyers, without loss to the British, in the battle of Cape Matapan, March 28, 1941.

Inside Italy, the war had been most unpopular from the outset. The military defeats in Greece and Africa, the entry of the U.S.A. into the war, and, above all, the intensive bombing of Italian cities by British and later U.S. air forces, brought an increasing restlessness among the people.

Allied Invasion of Italy

After the capture of Tripoli, last remnant of Italy's overseas empire, on Jan. 1, 1943, the prestige of fascism fell very low indeed. The fall of Tunis meant that the war was soon to be fought on Italian soil. The general desire to end the war grew apace, while the fascist party itself was disintegrating. The Allies invaded Sicily on July 10.

During the night between July 24 and 25 the fascist grand council passed a motion which amounted to a vote of no confidence in Mussolini. The next day he went to

the king, to find himself dismissed; he was arrested, and the king asked Marshal Badoglio to form a government.

Mussolini's fall was the cause of much rejoicing in Italy, but the government, in deadly fear of falling prey to the Germans who were already pouring into the country, hesitated to open negotiations with the Allies, and an armistice was signed at Cassibile, near Syracuse in Sicily, only on Sept. 3 to come into effect on Sept. 8. By that time the Italian army had disintegrated. Italy's unconditional surrender to the Allies was signed by Badoglio on board the British battleship Nelson on Sept. 29.

By the time the Allies landed in Calabria, on Sept. 3, there were 20 well-equipped German divs. in Italy. The king, the government, and the high command left Rome for Brindisi, behind the Allied lines, and the Germans occupied the country to Naples and beyond. Mussolini, held under guard on the Gran Sasso, in the Apennines, was rescued by German parachutists, and set up a puppet fascist republic in N. Italy at Salo. The Allies entered Naples on Oct. 1. On the 13th, against the king's wishes, Badoglio's government declared war on Germany, and the Allies recognized Italy as a co-belligerent. Most of the Italian fleet had already joined the Allies at Malta.

A Divided Italy

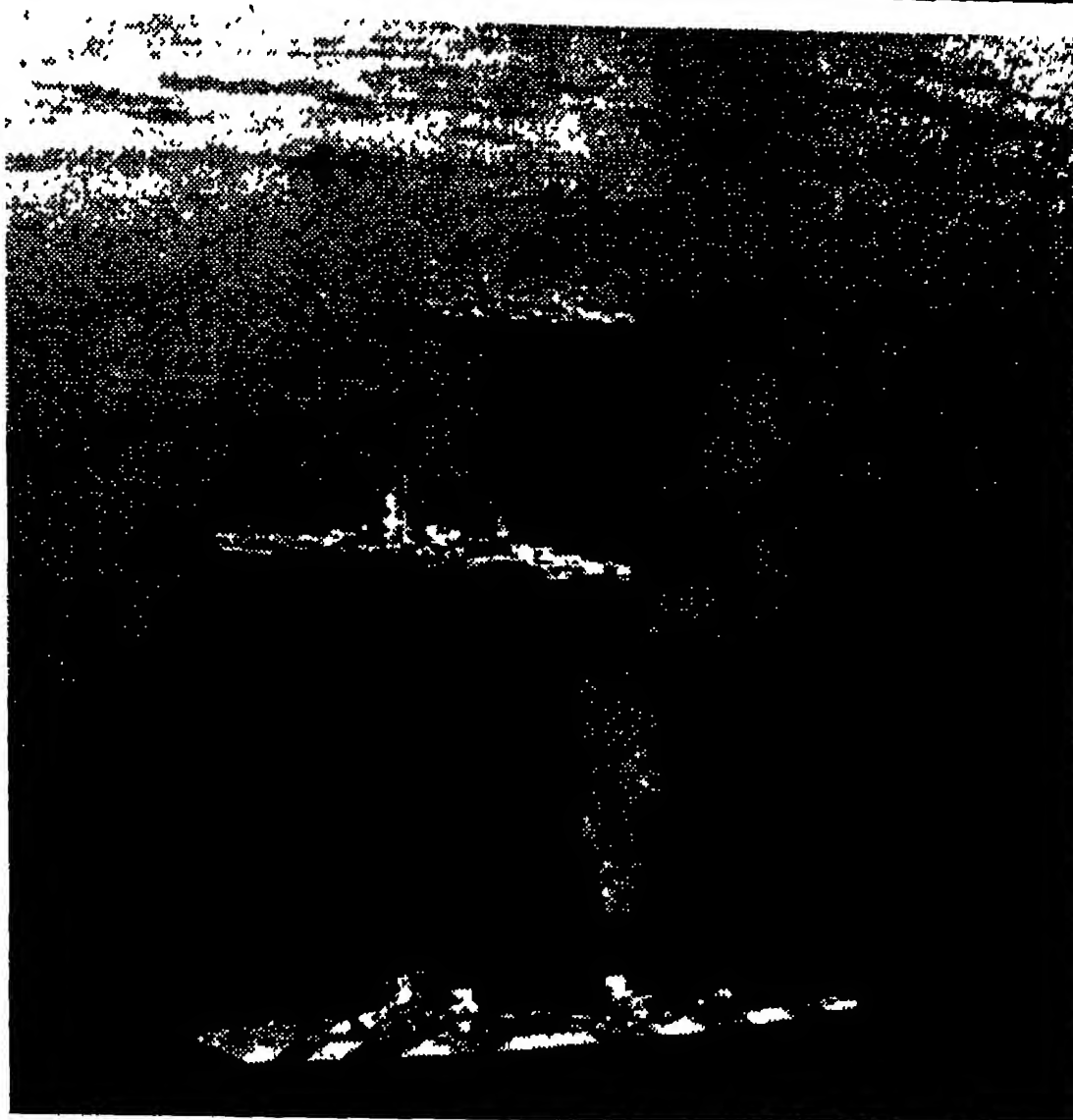
Thus began for Italy the real tragedy of the war, with the people divided among themselves into pro-Allies and neo-fascists; while the Allies' campaign against the Germans went on doggedly mile by mile, leaving behind it a terrible trail of misery and destruction—much of it, like the rooting up of

the railways, and the blowing up of ancient bridges, in particular those of Florence, wanton devastation by the Germans. (For the fighting in Italy, *v.i.* Italy, Campaign in, 1943-45.)

Allied Military Government was set up in Italian territory as it was cleared of the Germans, immediately in the wake of the advancing Allied forces. It began to function in Sicily in July, 1943, and on the mainland in Nov., 1943. It had the threefold object of ensuring military security in the rear, exploiting the civil effects of victory, and restoring civil life among the Italian population to a normal basis.

ment's inability to control the activities of the black market.

Italian forces were gradually taking an increasing part in the process of liberation (six Italian divisions fought with the Allied 8th Army); while the number of partisans actively fighting in the N. was estimated at 200,000—nearly 100,000 lost their lives. Drawn from all classes and all parties, united and organized under local committees of national liberation, they did invaluable work for the Allies. They rose on April 24, liberating Milan, Genoa, and Turin two days before the surrender of the German army in



Italy. The Italian fleet, including the Eugenio de Savoia (foreground) and the Andrea Doria, lying off the Grand Harbour, Malta, where it arrived to join the British fleet Sept. 10, 1943



Italy. Marshal Badoglio on board H.M.S. Nelson with (left to right) Lord Gort, Air Marshal Tedder, Gen. Mason-Macfarlane (governor and c.-in-c. Gibraltar), General Eisenhower, and General Alexander, after signing Italy's unconditional surrender Sept. 29, 1943



Italy. Mussolini and his mistress Clara Petacci hanged by the heels in the Piazza Loreto, Milan, after being shot dead at Dongo, Lake Como, by Italian partisans

Italy on April 29. Mussolini was caught by partisans on the 28th at Dongo, Lake Como, while trying to escape to Switzerland, and executed immediately.

Italy was, politically and economically, in a state of prostration and turmoil; but by the end of 1945 Allied Military Government had handed back to Italian control all Italy except Venezia Giulia, Udine, and S. Tirol. The Bonomi government resigned in June, and Ferruccio Parri held the premiership until Alcide de Gasperi (1881-1954) became head of a coalition government in Dec. De Gasperi's long period of office (1945-53), coincided with the remarkable recovery and reconstruction of the country, ravaged and prostrated by the war, and proved the stature and statesmanship of this Christian-Democratic leader who had been a staunch opponent of fascism throughout the regime, and who succeeded in giving stability to Italian political life.

On May 9, 1946, Victor Emmanuel III handed over his crown to his son Humbert II. A few weeks later, in June, 1946, a referendum gave 12,718,641 votes for a republic, 10,718,502 for the monarchy. The king retired to exile in Portugal, and on June 28 the newly elected constituent assembly appointed Enrico de Nicola provisional president. In the constituent assembly no party had a working majority, and de

Gasperi formed a new coalition govt. The assembly prepared a new constitution which came into force in Jan., 1948. Another election, in April, gave the Christian-Democrats a resounding victory—307 against a combined total of 182 for all other parties—and confirmed a much strengthened de Gasperi in office. Luigi Einaudi in May became the first elected president of the republic. The treaty of peace between Italy and the Allies was signed in Paris, Feb. 10, 1947, and ratified; it came into force at midnight of Sept. 15-16, 1947. It transferred a large part of Venezia Giulia and the Zara (Zadar) enclave to Yugoslavia, and four small areas in the Alps Maritimes to France; the cession of the Dodecanese to Greece was confirmed. Italy renounced all right and title to its former colonies (*v.s.* COLONIAL EMPIRE). Other clauses covered payment of reparations to Russia, Yugoslavia, Greece, Abyssinia, Albania. The fate of Trieste, which the Allies wanted to make a free territory, was left in doubt until 1954 when it reverted to Italy (*see* Trieste).

In 1950 a 10-year plan for the development of S. Italy was drawn up; it included land reclamation and irrigation, and construction of new roads, aqueducts, and hydro-electric plants; a land reform act made three million acres available to landless peasants and farm labourers.

The most striking developments of the post-war period were the swift economic recovery; the steep increase in production; the efficient reconstruction of roads, railways, power stations, houses, and factories; and the exploitation of the newly discovered gas and petrol resources. Problems remained to be solved, *e.g.* unemployment, underdevelopment in S. Italy, balance of payments.

Italy participated in the European recovery programme, in the

North Atlantic Treaty, and in the European coal and steel community, defence community, etc.

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LANGUAGE AND LITERATURE. The Italian language emerged c. A.D. 1000, in the shape of numerous dialects, out of the Latin language; but Latin remained the language used in writings, in the compilation of documents and of (mainly legal and theological) works, as it had been through the 600 years of barbarian conquest after Boetius (c. 474-525). Even for a long time afterwards those who might have been the greatest Italian prose writers—Petrarch, Poliziano, Pontano, and Aeneas Sylvius, for instance—continued to use Latin, since that was the common language of educated Europe. Dante's *Vita Nuova*, written about 1292, was the first prose work of any importance in the vernacular, for Dante was the first to realize that a living work of art cannot be written in a dead language. But long before him S. Francis had produced a poetic masterpiece in Italian with his *Cantico di Frate Sole*; and as Dante acknowledged, an Italian poetic language was devised for the first time when, about 1220, the emperor Frederick II established a brilliant literary court at Palermo, and, himself a poet, patronised a school of vernacular poetry cast in the forms developed by the Provençal troubadours. The diffuse forms of the Provençal lyric were presently condensed and regularised by Italian writers into the sonnet, canzone, and ballata. After the destruction of the Hohenstaufen dynasty, the University of Bologna, through Guido Guinicelli (d. 1276), handed on the torch of literature from Sicily to Tuscany, where Guittone d'Arezzo and Brunetto Latini had already created a tradition of vernacular poetry.

Guinicelli's example started a poetic movement in Tuscany called the "*dolce stil novo*" (sweet new style); its main exponents, apart from Dante, were Cino da Pistola and Guido Cavalcanti;

they refined and dignified lyric poetry, mingling the chivalrous sentiment of the troubadours with the science of Aristotle and the thought of Aquinas. But Dante belonged, also, to the new era through his appreciation of individuality and delineation of real life. His life was divided between politics (which resulted in his banishment in 1302), spiritual love, and poetry. Politics produced philosophical treatises like the *De Monarchia*. The poetry of spiritual love was inspired by Beatrice. In the *Vita Nuova* he recorded his intense platonic passion for her; the *Divina Commedia* is his poetic apotheosis of her after her death. This great epic suffices in itself to place Italian literature in the first rank. By writing in Tuscan rather than in Latin, Dante promoted the Florentine idiom to the dignity of being definitely accepted as the Italian language.

Petrarch and Boccaccio

At this time there began a revival of interest in the great writers of antiquity, and an attempt to recapture the classical tradition in its purity, free from the distortions brought about by ignorance in the Middle Ages. Francesco Petrarca (1304-74), commonly called Petrarch in English, and, under his stimulus, Giovanni Boccaccio (1313-75), were the most enthusiastic propagandists of such humanistic studies. But their importance lies chiefly in this, that while Petrarch, following Dante and inspired by Laura, confirmed the choice of the Tuscan dialect as the vehicle of Italian poetry, Boccaccio performed the same service for Italian prose. Petrarch's *Rime* were a model of elegance, refinement, and poetic feeling to countless generations all over Europe.

Boccaccio studied Greek, and popularised classical literature; he lectured on Dante, and in his *Teseide* and *Filostrato* chose the octave stanza for Italian epic poetry. But his great achievement was *Il Decamerone*, in the introduction to which, echoing Thucydides, he drew, in vigorous unaffected prose, a wonderful picture of the plague of 1348 (see *Decameron*). This work is a "human comedy," portraying with inexhaustible zest the infinite facets of life. His earlier stories, *Filocolo* and *Ameto*, the forerunners of pastoral and psychological romance, were written in an artificial and ornate style. Boccaccio was succeeded as a

writer of short stories by the Florentines Franco Sacchetti and Giovanni Fiorentino, the Neapolitan Masuccio, and in the 16th century by Matteo Bandello and Grazzini (*Il Lasca*), a founder of the famous *Accademia della Crusca*. Most of their stories are based upon actual incidents of public or private life, and they present, therefore, a valuable picture of the times. Gianfrancesco Straparola, in his *Notti Piacevoli*, 1554, set the example, brilliantly followed in the *Pentamerone* of Count Giovanni Basile, of founding his tales upon folklore. The stories of Giovanni Cinthio (b. 1504) and Luigi da Porto (d. 1529) have attained immortality as the source of some of Shakespeare's plays.

The chroniclers Dino Campagni and Giovanni Villani have an important place in the early development of Italian prose.

Enthusiasm for humanistic studies slowed down the progress of Italian literature in the hundred years that followed Boccaccio's death, so that few great names are encountered until the second half of the 15th century.

After the fall of Constantinople to the Turks, 1543, the study of Greek was revived by refugee scholars. Enthusiasm for Greek literature had already been roused by Manuel Chrysoloras who, coming to seek aid against the Turks, had lectured at Florence and elsewhere. Classical scholarship was now eagerly studied, especially at Florence, in the Neo-Platonic Academy founded by Marsilio Ficino under the auspices of Cosimo and Lorenzo de' Medici. Almost simultaneously there came a revival of Italian letters. Lorenzo's own polished lyrics, now serious, now gay, and those of Poliziano, the brilliant classical scholar, pulsating with a deeper note of poetry, gave literary form to the racy popular songs of Tuscany. Poliziano's lyric tragedy, *Orfeo*, inaugurated the long tradition of Italian pastoral idyll.

Leon Battista Alberti (1404-72) revived the tradition of Italian prose; and the Neapolitan Jacopo Sannazzaro (1458-1530), with his pastoral romance, *Arcadia*, imitated by Sir Philip Sidney, created a work in Italian that was full of classical flavour. Luigi Pulci (1432-87) produced in *Morgante Maggiore* the first great modern revival of the chivalrous epics in which Charlemagne and his paladins were eulogised as the conquerors of the Pagans. Wit combined with consummate story-

telling contributed to the vitality of the romantic epic in Italy. Together with Boiardo and Ariosto, Pulci created a new literary genre. Orlando and Rinaldo, whose characters are finely drawn in his poem, are also the noble heroes of *Orlando Innamorato*. This romantic epic was left unfinished by Matteo Boiardo, a courtier of Ferrara (1434-94). It was continued, in an even more brilliant manner, with perfervid imagination and characteristic Italian ironic wit, by another courtier of the house of Este, Ludovico Ariosto. In the melodious flow of masterly narrative, in delicious burlesque episodes, in the wealth of his similes and the beauty of his reflections, *Orlando Furioso* reveals Ariosto as a poet who ranks next to the greatest.

Cellini and Michelangelo as Writers

During the golden era of the High Renaissance which followed, art and the study of science and the classics absorbed much of the genius of the nation. But many artists left their mark in literature. Giorgio Vasari wrote the lives of painters and sculptors; Benvenuto Cellini, the Florentine goldsmith, wrote an autobiography, a frank and fascinating human document in which he painted the life and manners of the 16th century. The sonnets of Michelangelo Buonarroti have the same quality of passionate strength and intensity as his sculpture and painting. In an age when all refinement centred in courts, Count Baldassare Castiglione set forth in his *Il Cortegiano*, 1528, the life of a courtier at Urbino, attaining in his book a high standard of elegance and polish. About the same time Giovanni della Casa wrote his *Galateo*, a manual of etiquette. His history of Italy during his own time marks the Florentine Francesco Guicciardini (1483-1540) as the first modern historian. Unlike Pietro Bembo's history of Venice, his is the work of a practical statesman. Guicciardini occupies a high place in political science. A staunch realist, far less idealistic than Machiavelli, impatient of theorising, he was a shrewd observer of men and events.

The greatest writer of this period was Niccolò Machiavelli. His history of Florence was a landmark in historiography no less than Guicciardini's work. But Machiavelli is perhaps best known as a writer on politics. Interpreting the political life of his day, and considering it, not in the light

of morality or dogma, but of practical experience, he endeavoured to show how the ideal ruler, guided by expediency, might check the inherent corruption of the state by repressive laws and versatile, unscrupulous statecraft. Dante had preached his ideal of a universal monarchy ruling in righteousness. It is Machiavelli's glory to have preached the necessity of a united Italy.

Sixteenth-century Poetry

In the 16th century much of Italian poetry, apart from the romantic epic, was Petrarchan or burlesque. The most notable among the followers of Petrarch were Sannazzaro, Luigi Tansillo, Angelo di Costanzo, Giovanni Guidiccioni, Annibal Caro, Giovanni della Casa, Antonio Tobaldeo, Bernardo Tasso, Francesco Molza, and Pietro Bembo, who was accepted as the literary dictator of his day. Of the innumerable writers of burlesque and satiric verse, the most important was Francesco Berni who gave his name (Bernesque) to the *capitoli*, burlesque essays in verse, typical of the spirit of the age. The Sofonisba, 1515, of Giorgio Trissino is the first blank verse tragedy in the vernacular. Trissino's lead was followed by Giraldo Cinzio, Speroni, Aretino. Comedy, too, modelled on Plautus and Terence, emerged in the work of Boiardo (Timone), Cardinal Bibbiena (Calandria), Ariosto (Cassaria), Machiavelli (Mandragola), and Pietro Aretino, a writer of genius but totally amoral. Pastoral comedy was perfected by Tasso (Aminta, 1573), and Giovanni Guarini (Pastor Fido, 1590). These were written in the irregular metre first introduced by Speroni (1500-88) in his classical tragedy Canace, and later associated with melodrama.

The counter-reformation, the Inquisition, and a censorship which repressed all original thought and criticism had deep repercussions on Italian literature. Yet Torquato Tasso, the last great genius of the Renaissance, owed something to the spirit of his age in his great Christian epic of the Crusades, Gerusalemme Liberata. Tasso, writing at the court of Ferrara, and tortured by the delusions of intermittent insanity, produced a poem which, though particularly successful in its lyrical passages, ranks as a great epic. The high inspiration of the Renaissance flagged in the 17th century. The poets of the baroque age sought

novelty at all costs and, at their worst, could produce only laboured conceits; at their best, in e.g. Giovan Battista Marino, they delighted in verbal virtuosity. Gabriello Chiabrera tried to follow a new path by aiming at the perfection of Greek form in his Canzoni.

Civil and ecclesiastical tyranny could persecute, but not suppress, the genius of men like Galileo, Telesio, Bruno, and Campanella, whose philosophical works entitle them to a place in literature as well as in science. A protest against oppression was bravely voiced by many: by Paolo Sarpi, in his history of the Council of Trent, against papal absolutism; by Salvator Rosa, the painter, in his satires, against corruption in high and low places; by Alessandro Tassoni, in his heroic comic poem La Secchia Rapita; by Traiano Boccalini, in his Ragguagli di Parnaso, against Spanish oppression.

Founding of the Arcadian Academy

As a reaction against the literary vices of the age the Arcadian academy was founded in 1690 in Rome; it set out to replace bad taste by simplicity. But the remedy—an affectation of simplicity—was as bad as the evil it combated. The greatest poet of the first half of the 18th century was Pietro Metastasio (whose poetic origins were deeply rooted in the Arcadian academy).

Owing to a change in social and political conditions, a literary revival began in the second half of the 18th century. The Lombard Giuseppe Parini and the Piedmontese Vittorio Alfieri deliberately broke with the conception that poetry is a pleasing vehicle for elegantly worded feelings, and forcefully expressed their moral conscience in their works: Parini in his long poem Il Giorno, and in his odes satirising the corrupt aristocracy of his times and pointing to a more honest way of life; Alfieri in his tragedies using historical themes to convey his ideas of liberty and his rebellion against tyrants. Important philosophical, historical, and social works were written during this period of growing enlightenment by G. B. Vico, L. A. Muratori, S. Maffei, and Cesare Beccaria. Meanwhile, in carefree Venice the genius Carlo Goldoni and the lesser Carlo Gozzi were producing some of the best Italian comedies. Ippolito Pindemonte, and even more Melchior Cesarotti with his

widely read and admired verse translation of the so-called Ossianic poems, brought to a country imbued with classical tradition something of the northern climes and initiated a preromantic movement.

Monti and Foscolo

Vincenzo Monti (1754-1828) and Ugo Foscolo (1778-1827) were the greatest writers at the beginning of the 19th century; Monti's easily inflamed inspiration and classically elegant style echoed the checkered events of his day; while Foscolo, romantic in temperament and classical in his education and opinions, rose to greater heights in his poem I Sepolcri, which is epic, tragic, and idyllic at the same time; his early novel Ultime Lettere di Jacopo Ortis is an impressive though not quite successful performance, soaked with pessimism and sentimental and patriotic despair. Foscolo died an exile in England, where he produced important works of literary criticism.

Conflict between the classical and the romantic schools raged soon after the end of the Napolconic era. The romantics triumphed. Their victory marked the first stage in a revulsion against the classical tradition—a tradition that was, and is, deeply ingrained in Italian literature. It fell to Alessandro Manzoni (1785-1873), the leader of the victorious romantic movement and the author of two tragedies, to give Italy its greatest novel, I Promessi Sposi, 1827; he expressed in it his deeply religious outlook on life, set against a realistically depicted historical background. This masterly work marked a turning point in the development of Italian literature and literary language; it was followed by a spate of historical novels, some of which were not devoid of merit (e.g. those of D'Azeglio and Grossi).

Giacomo Leopardi (1798-1837) was by far the greatest poet of his time; wonderfully equipped with classical learning, he stood above all schools in his Canti—lyrical poems in which he uttered his cry of despair, and achieved poetic perfection. Much of the poetry of the Risorgimento period was patriotic (romanticism in literature and liberalism in politics went hand in hand), and therefore was more remarkable for its warmth and enthusiasm than for its poetic merits. Gabriele Rossetti (the father of Dante Gabriel and Christina), Mameli, Berchet, Giannone, and many others, beside

Manzoni, Leopardi, and the playwright Niccolini, all wrote patriotic poems; while Giuseppe Giusti used his own brand of Tuscan humour and satire on political and more general topics. A special place in patriotic literature belongs to a famous book, *Le Mie Prigioni*, the romantic dramatist Silvio Pellico's moving account of his experiences when he was imprisoned by the Austrians.

Political Works

Giuseppe Mazzini wrote innumerable works advocating a republican Italy within the framework of a regenerated Europe; Vincenzo Gioberti, in *Il Primato degli Italiani*, 1843, proposed a confederation under the presidency of the pope; Cesare Balbo, in *Delle Speranze d'Italia*, 1844, a confederation led by Piedmont.

A tendency towards realism in narrative literature, heralded by Nievo's novel, *Le Memorie di un Ottuagenario*, and Rovani's *I Cento Anni*, gained strength from the support of a "bohemian" literary movement in Milan called *Scapigliatura*, and eventually led to a full-blown realistic school, drawing for the most part on life in some particular town or district ("regionalism"), and thriving particularly in S. Italy. Giovanni Verga, e.g., portrayed his native Sicily in his two masterpieces (*I Malavoglia*; *Maestro Don Gesualdo*). Other realistic writers were L. Capuana, M. Serao, G. Deledda. Antonio Fogazzaro was driven by his mysticism to use his art as a means of inculcating his religious views.

Much first-rate historical work, local and national, was done by Gino Capponi, Cantù, Troya, Colletta, Pasquale Villari, and Ruggero Bonghi.

In poetry, the classical tradition reasserted itself in the work of G. Zanella, Giosuè Carducci (1835-1907), a rebel against the fluent but feeble romanticism of the followers of the mid-century poets, G. Prati and A. Aleardi. Carducci drew his inspiration from history, particularly Italian history, and resorted to the classics as his models. His vigorous personality dominated the scene until the end of the century, when Giovanni Pascoli (1855-1912) and Gabriele d'Annunzio (1863-1938) emerged. Pascoli's art was less robust than Carducci's, but at his best he was tender and lyrical. D'Annunzio, a more colourful figure (novelist, dramatist, and lyric poet, as well as free-lance warrior in the First

Great War and amateur politician after it), struck a frankly sensuous note in his musical and sometimes rhetorical poems. While d'Annunzio chose to dazzle himself and his readers by his glittering poetic images and his poses as a superman, others, the poets of the twilight (*Crepuscolari*), expressed the emptiness and frustration of life in a mood of disillusionment and disenchantment; G. Gozzano was the most significant of these.

The reaction against the classical tradition gained momentum in the 20th century. Some *avant-garde* groups (*Futuristi*) produced nothing but destructive zeal; yet they were a symptom of a spiritual crisis which developed in the 1920s and '30s into a poetic movement called *Ermetismo*, led by G. Ungaretti and E. Montale. By then Italian poetry was in the throes of a far-reaching process of reassessment and re-examination.

Luigi Pirandello (also a novelist and short-story writer) dominated the Italian stage in the first half of the 20th century with his stimulating and analytical plays; many, such as U. Betti, followed in his wake.

The Fascist Period

The fascist period was, on the whole, unproductive. Some well-established writers (e.g., G. Papini) held the public eye, while a highly original novelist, I. Svevo, won only belated and posthumous recognition. An anti-fascist exile, I. Silone, acquired international fame with his novels long before his name became known to his compatriots; at the same time A. Palazzeschi, R. Bacchelli, A. Moravia were experimenting in different ways.

The realistic tradition of the late 19th century was revived after the Second Great War by C. Pavese, E. Vittorini, V. Pratolini, and others. This youthful and vigorous movement expressed the new-found vitality of Italian writers after the harrowing experiences of fascism and of the war. Reality was their theme, but a reality lyrically transformed, and interpreted through ceaseless introspection.

The main influence on critical thought, that of the great philosopher, historian, and literary critic Benedetto Croce (1866-1952), made itself felt through *La Critica*, the review founded and edited by him, and through his own imposing output of works.

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ART. The civilization of ancient Rome sank too deeply into the heart of Italy to be ever quite forgotten. Throughout the dark ages classical traditions lingered on, and a Roman school of painting remained in existence until the papal see was removed to Avignon. At the same time the influence of Byzantine art made itself felt in Sicily and Apulia, at Venice and Ravenna, while Tuscan painters adopted the types laid down by the second council of Nicaea for the representation of Christian subjects. It was not till the beginning of the 14th century that a revival came.

Giotto, the great awakener, according to the old legend, was taken straight from the sheepfolds to be the pupil of Cimabue; but he probably owed more to the sculptor, Giovanni Pisano, and to Pietro Cavallini, a Roman master, whose recently discovered frescoes in S. Cecilia show a marked affinity with the types usually called Giottesque. It is at Assisi that the first-fruits of the new art must be sought. Roman and Tuscan masters adorn the walls of the sanctuary that arose above the tomb of S. Francis with frescoes of Old and New Testament story, and in the upper church the young Giotto painted his wonderful series of scenes from the life of the great evangelist. Much of Giotto's work has perished and what is left has been ruined by decay and restoration; but his frescoes at Assisi, Padua, and Florence revealed the new life which he brought to art.

Masaccio and His Followers

The next step forward was taken by Masaccio, who gave a new direction to Florentine art, and whose frescoes in the Brancacci chapel became an example for generations of painters. They showed the influence exerted on the sister art by the great sculptors Brunelleschi and Donatello. Throughout the 15th century a succession of gifted masters developed Masaccio's principles in different directions. Fra Angelico painted the heavenly visions of his pure and tender soul on the

monastery walls of S. Mark, while the moreworldly minded Carmelite, Fra Filippo Lippi, gave free expression to his delight in natural beauty and human joys and sorrows. Paolo Uccello grapples successfully with problems of flight and movement, of perspective and light and shade, while the goldsmith-painters, Pollaiuolo and Verrocchio, lent plastic relief to painted forms by vigorous drawing and modelling, and made experiments with oil varnishes in the new medium that was rapidly taking the place of tempera.

Byzantine Influence in Siena

Meanwhile the movement inaugurated by Giotto was spreading throughout Italy. Byzantine traditions lingered longest in Siena, where the art of Duccio and his followers had a peculiar sweetness and decorative charm, and Giotto's influence was slow in penetrating. Simone Martini, though particularly touching in his religious paintings, was the first to attempt non-religious subjects. In Umbria, Florentine principles were introduced by the Tuscan master, Piero della Francesca, and by Fra Angelico's follower, Benozzo Gozzoli, who worked in Perugia and the neighbouring hill-cities. Here a long line of talented artists led up to Perugino, with his wistful madonnas and yearning saints set in wide landscapes under sunlit skies.

Giotto's frescoes at Padua and Donatello's bronzes in the great basilica of Il Santo produced a striking effect on the development of art in N. Italy. Here Mantegna imbibed the passion for classical antiquity reflected in his works, and the Veronese masters Altichiero and Pisanello gained the knowledge which they passed on to Foppa, the founder of the Lombard school. While in Tuscany and Umbria painting flourished under the protection of the free republics, the merchant guilds, and the great religious orders, and in Rome popes and cardinals encouraged art in all its branches, N. Italian painters found their best patrons in the reigning families of the city states. The courts of the Estes at Ferrara, of the Gonzagas at Mantua, of the Sforzas at Milan, and of the Bentivoglios at Bologna became centres of light and learning to which the foremost masters were attracted. Farther S. the Malatestas of Rimini and the rulers of the house of Aragon and Naples evinced the same interest in art and artists, while it is the glory of the little

court of Urbino to have fostered the genius of the youthful Raphael.

Painting at its Zenith

Italian painting reached its zenith towards the close of the 15th century, and the years 1480-1520 witnessed an unequalled outburst of artistic activity. A chosen band of Florentine and Umbrian masters painted the frescoes of the Sistine chapel in the Vatican, Ghirlandaio filled the churches of Florence with portrait groups of his contemporaries, and Benozzo Gozzoli completed the long series of pictures in the Campo Santo of Pisa (left in a lamentable condition from fire in the Second Great War). Perugino adorned the Exchange at Perugia with allegorical figures and Roman warriors, while Pinturicchio painted the story of Aeneas Sylvius in the cathedral library at Siena, and Luca Signorelli represented the terrors and glories of the Last Judgement in the Duomo at Orvieto. Sandro Botticelli decorated the Medici villas and shrines with Greek myths and madonnas as human as Fra Filippo's and as spiritual as those of Angelico, and Leonardo da Vinci painted his divine Cenacolo and the immortal portrait of Mona Lisa. Michelangelo unfolded the epic of Creation and Redemption in the sublime frescoes of the Sistine chapel; while in the Vatican halls, the finest thought of Renaissance scholars on the philosophy of Greece and the faith of the Catholic Church was set forth in the consummate art of Raphael.

In this age of the full Renaissance Florence retained her old prestige, and the greatest masters who were not her citizens came to complete their education within her walls. Here Perugino and Signorelli acquired their technical skill, and Raphael, after assimilating all that was best in Umbrian and Ferrarese art, came to learn fresh lessons in the Brancacci chapel and the cells of S. Mark.

One school alone, that of Venice, stood apart from the rest, and was comparatively little affected by Florentine examples. Even here Gentile da Fabriano and Pisanello were employed in the 15th century to paint the council hall in the ducal palace, and the Bellini brothers owed much to their early connexion with Mantegna and the school of Padua. But from the first Venetian art bore a strongly distinctive character.

The art of Venice was conspicuous for splendour of colour. The deep

religious feeling and high imaginative gifts of the Venetians found expression in the madonnas and pias of Giovanni Bellini, and in the lyrical dreams of Giorgione, while their natural love of pageantry was embodied in the mural paintings of the ducal palace and of the walls of the wealthy confraternities. Portraiture was another branch of art in which the Venetians excelled and in which the Bellinis, Giorgione, Lotto, and Tintoretto alike displayed their individual talents. All these different strains reached their highest development in the work of Titian who, like most Venetian painters, delighted in depicting female beauty.

Titian's Successors

Titian was followed by a succession of brilliant painters who decorated vast spaces on an imposing scale. Tintoretto, Paolo Veronese, and later Tiepolo attained a just celebrity in this field, while the 18th-century landscape painters Canaletto and Guardi were hardly less renowned.

In Florence the after-glow of the Renaissance lingered on in the work of Andrea del Sarto and his followers, while at Parma, in the N.E. of the country, the young Correggio rendered the joy of life with spontaneous charm.

In the 17th century the counter-reformation produced a corresponding revival in art and gave rise to the school of the Carracci at Bologna. The aim of these painters and of their principal followers, Guido Reni and Domenichino, was to imitate the great Renaissance masters, but the spirit of their time was quite different from that of the High Renaissance, so that their works, though technically no less skilful than those of the great masters of the 14th and 15th centuries, do not produce the same effect. The many true innovators included the talented, temperamental Caravaggio, who experimented with violent contrasts of light and shadow; and the romantic Salvator Rosa, who was one of the pioneers of landscape painting.

The neo-classical age was overshadowed by the personality of a great sculptor, Canova; this is apparent, e.g., in the works of Andrea Appiani, a painter very much of his own time. With romanticism, colour prevailed once again over construction and draughtsmanship. The 19th-century painters Francesco Hayez, Tranquillo Crumona, Mosè Bianchi

felt in their different ways the fascination of colour; while Antonio Mancini, Giovanni Segantini, Antonio Fontanesi all showed the influence of the French school, and at the same time revealed a marked artistic personality.

It is difficult to discern definite trends in the 20th century. At its outset, Futurism, with its negative creed, created a stir; it also, in the hands of gifted artists (Umberto Boccioni; Carlo Carrà) produced some results. Giorgio de Chirico was another highly individual painter. The many movements and personalities that drew the attention of the public in the 20th century revealed a continuing conflict between the wish to treasure the experience of past generations and a groping towards new ways of expression.

Noteworthy Sculptors

The first great Italian sculptor was Nicola Pisano (c. 1206-78), whose pulpit in the baptistery of Pisa marks an epoch. Roman, Byzantine, and French Gothic elements are all apparent in his work, while the more dramatic genius of his son Giovanni exerted a powerful influence on Giotto and his contemporaries. Florence became the centre of the sculptor's art, and the followers of Pisano (Andrea Orcagna, etc.) adorned shrines with a series of famous works, the reliefs of the Campanile, the statues of the Duomo and Or San Michele, and the gilded gates of the baptistery.

Three masters were prominent among the Florentine sculptors in the early years of the 15th century. Lorenzo Ghiberti introduced new decorative charm into plastic art by his skilful use of landscape; Luca della Robbia combined a consummate mastery of composition with tender devotional feeling; and Donatello grafted his vigorous realism on a profound study of the antique.

A host of artists followed in the steps of Ghiberti and Luca, while Donatello's mantle fell on the goldsmith artists, Antonio Pollaiuolo, whose intimate knowledge of the human form and power of rendering movement brought new life to sculpture, and Andrea Verrocchio, whose equestrian statue of Colleoni in Venice is a worthy rival of Donatello's Gattamelata. The presence of this last-named statue in Padua, and of Donatello's other masterpiece, the high altar of S. Antonio, gave a marked impulse to sculpture in N. Italy. Here the Visconti and the Sforza

dukes—in the Duomo of Milan and the Certosa of Pavia—fostered the growth of a new and flourishing school. Chief among those sculptors was Omodeo, whose sympathy with humanist studies and delight in rich ornament are displayed in the sumptuous façade of the certosa.

Italian sculpture, whether Florentine or Lombard, Roman or Venetian, excelled, above all, in the execution of portrait busts and sepulchral monuments. Countless examples of these busts are to be seen in the museums of Florence, at South Kensington, and in the Louvre, while the tombs of the Scaligeri in Verona, of the popes in Rome, and of the doges in Venice, the monument of the cardinal of Portugal at San Miniato and, the Sforza effigies at the Certosa, are among the best known works of the Renaissance. An earlier and even more beautiful tomb is that of Ilaria del Carretto at Lucca by a Sienese master, Jacopo della Quercia, whose noble reliefs on the portal of San Petronio at Bologna influenced Michelangelo.

Michelangelo as Sculptor

Michelangelo, great painter, poet, and architect, always declared that sculpture was his favourite form of art, and it is as a sculptor that he is pre-eminent. From the first he realized the full significance of the human body, its value decoratively and as a means of expression. He put his understanding into his works—the Pietà in S. Peter's, the colossal David, and the Tombs of the Medici. After his death the great traditions of his art were carried on in various forms by such masters as Sansovino, Benvenuto Cellini, and Giovanni da Bologna, the popular sculptor of the marble groups and fountains which adorn the squares and gardens of Florence. These again were succeeded by Bernini, whose talent and amazing activity raised Baroque art to its highest peak and added to the beauty of Rome. Among his great works the exedra in S. Peter's Square, Rome, the group Apollo and Daphne, and innumerable other marble and bronze statues testify to his exuberance and amazing skill in conveying an impression of movement. A renewed interest in classical archaeology fostered the neo-classical style in the late 18th and early 19th centuries. Antonio Canova was the unchallenged master of the neo-classical school; he aimed at reproducing classical beauty and

at rendering the human body with truth and elegance. Canova's influence lasted until it was replaced by romantic, and later impressionistic, tendencies. In the 20th century sculpture, no less than painting, showed a multiplicity of trends and an urge for novelty of representation.

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Italy, CAMPAIGN IN, 1943-45. The conquest of Sicily was the first stage in the Allied campaign against Axis-occupied Europe. The planning for Operation Husky, as it was called, began before the N. Africa campaign ended.

Axis forces in Sicily amounted to 12 divisions: 10 Italian and two German. A fleet of nearly 3,000 vessels of all types carried to the island two Allied armies—British 8th, commanded by Gen. Montgomery, and U.S. 7th commanded by Gen. Patton—of a total strength of about 12 divisions. The airborne troops who preceded them failed, owing to heavy cross winds, to pick out their appointed landing areas, and many men were dropped wide of their objectives—some of them into the sea. They succeeded nevertheless in throwing the enemy's second line of defence into confusion by the time sea-borne British and U.S. forces landed on beaches between Licata and Cassibile in the early hours of July 10, 1943.

Within two days 8th army troops were in possession of the S.E. coast from Cape Passero to Augusta, Syracuse becoming the army's main supply base, while from Pachino airfield close fighter support was given to the troops as they advanced. The 7th army secured Gela and Licata on the S. coast and beat off the first German counter-attack.

The 8th army advanced N. towards Catania along the coast and inland towards Caltagirone and Enna. The Germans, realizing the threat to Messina and their communications with Italy, transferred the bulk of their forces E., holding up the capture of Catania, and of the airfields near Gerbini,

in the plain of Catania, and delaying the advance on Vizzini. The 7th army, against only slight opposition, thrust N. to Caltanissetta and on towards Palermo, capital of Sicily, captured July 22. The Americans entered Marsala next day, Trapani on the 24th.

Only N.E. Sicily remained in enemy hands. There Mt. Etna with its foothills dominated the approach to Messina from the S. and the mountainous country abounded in formidable natural obstacles, made more difficult by skilful demolition. At the same time, the Mount Etna bastion afforded excellent sites for the observation of every movement of the British forces.

Conquest of Sicily Completed

Having cleared W. Sicily, the Americans were able to turn E., and as they advanced on Nicosia, Troina, and Randazzo W. and N. of the Etna bastion, 8th army made an attack outflanking Catania. Centuripe, most formidable strong point on the road from Catania to central Sicily, was stormed on Aug. 2 by the British 78th div. in one of the outstanding actions of the Sicily campaign. When Centuripe fell, the fall of Adrano, key to the whole Etna bastion, was certain. The Germans withdrew from Catania on the 5th. Canadians captured Adrano on the 7th, Americans took Troina on the 6th and Randazzo on the 13th. The whole of Etna was in Allied hands by the 14th. But wholesale demolition delayed 8th army's advance, and to speed the enemy's retreat, on Aug. 16, a commando landing was made at Scaletta, eight m. S. of Messina, while an American amphibious force landed beyond Milazzo on the N. coast, about eight m. W. of Messina. The Americans entered the city the same evening, the British early next morning, and the campaign was over. It had taken 38 days instead of the 90 for which the Allies had been prepared. In it the Germans had lost at least 23,000 killed and wounded, the Italians between 7,000 and 8,000; 8th army casualties were 11,853. 7th army's 7,500.

The Sicily campaign was the first in which troops were maintained over open beaches for a considerable period. The Bailey bridge (*q.v.*) proved itself the outstanding road-engineering achievement of the war; while valuable lessons in administration and maintenance of armies over mountainous country with limited road and port facilities were gained.

The rapid conquest of Sicily had been a severe shock for the Italians, and was responsible for their surrender on Sept. 3, the day Montgomery's reconstituted 8th army landed at Reggio di Calabria. Opposition was slight and no mines or demolitions were encountered. In a week the strait of Messina was under Allied control. On Sept. 9 the 5th army, composed of U.S. and British troops commanded by the U.S. Lieut.-Gen. Mark W. Clark, landed in the gulf of Salerno: this was the main Allied descent. On the same day a British naval force entered Taranto harbour and landed British troops of the 1st airborne div., who reached Brindisi two days later; both these important ports were secured intact.

The Salerno landing encountered bitter resistance and for three days was in danger of being thrown back into the sea; but reinforcements, including armour, were landed by sea and air, while fire from Allied naval vessels broke up enemy tank attacks, and by the 15th the position had been consolidated. Pressure on the Salerno front was relieved by the advance of 8th army. Canadian troops took Crotone port and airfields on the 12th, the British reached Cosenza on the 13th. On the 16th 8th army was at Vallo, and next day made contact with 5th army at Agrapoli, on the S. side of the gulf of Salerno. The Canadians took Potenza on Sept. 21. Hard fighting continued around Salerno, but by the end of the month the Americans were in Avellino, on the mainland E. of Naples. The Allies now held a line across Italy to the Gargano peninsula, having taken the important Foggia airfields, from which not only could German objectives in Italy be attacked, but also long-range bombers could be sent to strike at Germany's war industries in central Europe, and at objectives in the Balkans.

Allied Entry into Naples

The Germans drew out of Naples on the night of Sept. 30 - Oct. 1, and at 8 a.m. on the 1st, 5th army entered the city, to receive a frantic ovation. The spiteful ingenuity of the Germans had augmented destruction in the city and harbour far beyond legitimate military demolition, and included delayed action bombs, one in the basement of the G.P.O. and another in a barracks in the centre of the city, which exploded on Oct. 7 and 10 respectively, both causing a number of deaths. The harbour was unusable, but three weeks' work

by Allied engineers brought it into service again.

A Royal Marine commando landed just S. of Termoli on the Adriatic on the night of Oct. 2-3, and by nightfall the town was in its hands. A month later 8th army crossed the Trigno, and the enemy fell back to the N. of the river Sangro. As they retreated, the Germans destroyed all bridges behind them. Moreover, the rivers were now in flood, and the engineering feats performed by Allied engineers under fire in getting bridges across the flooded rivers called for both courage and technical skill.

Advance towards Cassino

The 5th army meanwhile had pushed on to the Volturno, across which Clark launched a full-scale attack on the night of Oct. 12-13. Resistance was determined, but by the 16th the enemy had been pushed back from the river line, and the Allied force on the W. continued to advance slowly against determined resistance towards Cassino, the strongest point in the so-called Gustav line (*q.v.*), which lay astride the road to Rome.

During the night of Nov. 27-28 Montgomery attacked across the Sangro. Enemy resistance was bitter, for the Germans had fortified the high ground beyond that river as a continuation of the Gustav line. The ridge was in British hands by noon on the 30th.

The difficult nature of the country to be traversed, and the urgency of securing Rome at the earliest possible moment, led the Allied high command to decide on an amphibious operation in the rear of the enemy's fortified line; but the impending invasions of N. and S. France made a heavy call on available landing craft, limiting the amount that could be spared to the Mediterranean command, and the time that it could be left there. A plan to land at Anzio on Dec. 20 had to be abandoned owing to the slowness of 5th army's advance.

A new attack on the night of Jan. 4-5, 1944, brought Allied forward troops to within three m. of Cassino, and on Jan. 7 the landing was set for the 22nd. The assault force of 50,000 British and U.S. troops and more than 5,000 vehicles was put ashore against negligible opposition, and by the evening of the 23rd both Anzio and Nettuno were in Allied hands intact. But Hitler issued a special order that the Gustav line must be held at all costs, and the German defence of Cassino stiffened.

At the same time Kesselring, c.-in-c. of the German forces in Italy, built up a strong force whose sustained efforts throughout Feb. to wipe out the Allied beach-head at Anzio met with stubborn resistance. The beach-head was maintained, but it was contained by the enemy.

For the course of the battle for Cassino, which resolved itself into a struggle for possession of the hill of that name dominating the town, *see* Cassino. Not until Monte Cassino was in Allied hands on May 18, and with it the whole Gustav line, were the Allied forces able to make further headway. The Germans withdrew to the Hitler line across the Liri valley, but a concerted attack coming from the main 5th army front and the Anzio beach-head forced the enemy out of that line too by May 25, on which day troops from Anzio and Cassino met near Borga Grappa.

Allies enter Rome

The Germans were now retreating rapidly. They drew off to the N. of Rome, and on June 4 Allied forces entered the capital. Strenuous efforts were made by the Allies to terminate the Italian campaign before the onset of another winter. With equal determination the Germans, with fascist Italian units, fought to hold the industrial N. At first the Allied armies followed swiftly after an enemy retreating in disorder. But the weakening of Allied strength by the withdrawal of some six divs. during June and July (in preparation for the landing in S. France), German reorganization, and the exceedingly difficult country in the mountainous backbone of Italy soon slowed down the advance. Pescara (June 10), Terni (June 15), Perugia (June 19), Siena (July 3), Ancona (July 18), Leghorn (July 29) fell in succession. Florence was occupied on Aug. 21. Pisa, at the W. end of the Gothic line, next German prepared defences, was captured Sept. 2; but Rimini at the E. end did not fall until Sept. 21, after nearly a month of bitter fighting in the environs. The capture of the Futa pass, centre pivot of the line, two days later, destroyed the line's effectiveness; but by that time torrential rains were falling, and major operations ceased until the spring.

The Allies had now left the mountains behind and entered a region intersected by streams and canals. Forli was captured on Nov. 5, Ravenna on Dec. 5,

Faenza on Dec. 16. A German attack in Tuscany on Dec. 26, intended to coincide with Rundstedt's break-through in the Ardennes, but, launched when that attack had spent itself, forced 5th army to abandon some ground.

Unconditional Surrender

Then in April the Allies launched a heavy two-pronged attack on Bologna, entered simultaneously on April 21 by troops of the 8th army from the E., of the 5th army from the S. and W. Ferrara and Modena fell to the 8th army on April 24; and the same day the 5th army entered the naval base of Spezia on the Ligurian Sea. Italian patriots rose, and secured control of Genoa, Milan, and other big cities of the N. The 5th army reached Genoa on the 27th, and on April 29 Col.-Gen. von Vlietinghoff-Scheel, Kesselring's successor, unconditionally surrendered to F.-M. Alexander, Allied c.-in-c., all German and fascist Italian forces in N. Italy and W. Austria. The surrender was made public on May 2, when it came into force.

Spearheads of the 5th army reached the Swiss frontier at Chiasso on April 29. New Zealand troops crossed the Isonzo May 1, and received the surrender of the German commander in Trieste on May 2. U.S. troops of the 5th army made contact near the Brenner pass with troops of U.S. 7th army from the N. on May 4.

Italy Star. A British military award instituted May 18, 1945, for any period of service in Sicily or Italy between June 11, 1943, and May 8, 1945. The ribbon is in Italian colours, green, white, and red, with five vertical stripes of equal width, red at either edge, green in the centre. The star is identical in shape and composition with the other campaign medals of the Second Great War. *See* Campaign Stars; Medals col. plate.

Itapua. Dept. in the S.E. of Paraguay. It is watered by the Paraná and tributaries, and is one of the most fertile and best cultivated districts of Paraguay, the principal product being fruit. The capital is Encarnación (*q.v.*) on the Paraná. Pop. 25,000.

Itatiaya. Highest mountain in Brazil. It is the loftiest peak, 10,000 ft., of the Serra da Mantiqueira, between the provs. of Rio de Janeiro and Minas Geraes.

Itch. Irritation of the superficial sensory nerves of the skin or mucous membrane, resulting in a compulsion to relieve it by scratching. It may be directly caused

by an exudation of the serous content of the blood through unhealthy vessel walls, as in chilblains; or by an alteration in the chemistry of the blood, such as a changed calcium content when too much juicy fruit is eaten. Another type of itch results from the bites of many blood-sucking insects, which introduce a chemical to render the blood less viscid and so more easily withdrawn by the proboscis. Vague itching is often associated with a depressed nervous state. Abnormal skin sensations characterise some cases of drug addiction. Itch is almost always a feature of severe jaundice. An external cause may be dust from factory work alighting on the skin. The cause may be mechanical, as in scabies or pediculosis.

Urticaria (popularly called nettle-rash) is an allergic reaction due to abnormal sensitivity to some foreign protein, and in susceptible persons it may result from eating shell fish or eggs. Another reason for itch is degenerative change in the tissues, usually in the older patient. Pruritus of the anus and of the vulva is a common condition.

Prolonged itch is more shattering to the nervous system than is pain. Tickling the soles of the feet, leaving no mark on the victim, was a favourite torture in history, revived in the Second Great War. The treatment of itch is essentially the cure of the causative condition. Mechanical irritations must be dealt with, and degenerating tissues treated by X-ray and suitable glandular therapy. A saline purge, the slow injection of large doses of calcium into a vein, the prescribing of an intestinal absorbent, are useful where the cause is a disturbance of the body chemistry, when the application of carbolic or weak cocaine to deaden sensation, or the injection locally of adrenalin, are indicated. Injection into a muscle of the patient's own blood often gives relief, though the reason is not clear. Histamine derivatives have a special value in allergic itches. At all costs itch must be controlled.

Hilary Ledgerwood, M.B.

Itchen. A river of Hampshire, England. Rising near Alresford in the centre of the co., it flows W. and then S. to Southampton Water, passing Winchester. It enters the sea by a tidal estuary of 3 m., and gives its name to an E. suburb of Southampton. Itchen Abbas is a village on the river, 5 m. N.E. of Winchester.

Another Ithen, in Warwickshire, is a tributary of the Avon.

Ithaca (mod. Itháki, Thíáki). One of the Ionian Islands (*q.v.*), which are Greek. In ancient times it was regarded as the home of Odysseus (Ulysses). It is 17 m. long, area 45 sq. m., traversed by a ridge of limestone rock, and its coasts are steep and rugged. Vines, currants, and olives are grown; while goat rearing and sponge and coral fisheries are the chief occupations. The island, devastated by earthquake in 1953, is cut almost in halves by the Gulf of Molo, on which stands the capital, Vathy.

Some consider the ancient Ithaca a fictitious island, others find it in Levkas, but the general opinion favours its identification with one of the Ionian islands.

Ithaca. A city of New York, U.S.A., the co. seat of Tompkins co. At the head of Cayuga Lake, 58 m. S.W. of Syracuse, it is served by rlys., an airport, and the state barge canal. In the centre of the Finger Lakes country, it is near three state parks, in one of which is the highest single waterfall E. of the Rockies, with a drop of 215 ft. Ithaca is the seat of Cornell university (*q.v.*), which specialises in scientific and agricultural projects, and Ithaca college, a centre of dramatic art and physical education. Industries include the manufacture of fire-arms, electrical apparatus, clocks, paper, cement, adding machines, leather goods, and salt. Settled in 1787 and originally called The Flats, Ithaca was incorporated in 1821, and became a city in 1888. Pop. (1950) 29,257.

Ithômē. A mt. fortress in Messenia, ancient Greece. The seat of the cult of Zeus Ithomas, during the first Messenian War (743-724 B.C.) Ithômē distinguished itself by its heroic resistance to the Spartans, and in the third (464-455) endured a ten years' siege. In 369 it became the acropolis of the new town of Messênē built at its foot by Epaminondas, when he restored the Messenian state.

Itinerary (Lat *itinerarium*). A gazetteer of ancient Roman roads compiled for the use of travellers, especially those making journeys in an official capacity. Some were in writing only, others contained maps. The extant *Itineraria Antonini* belong to the former class.

Ito, Hirobumi, Prince (1841-1909). Japanese statesman. Born in Choshun province, he made his way to London in 1861, and after two years in Europe returned to

Japan, where, against much opposition, he set himself to introduce European civilization and methods.

In 1878 Ito became minister of the interior, and in 1886 premier for the first of four terms. On Feb. 11, 1889, the constitution, drafted by himself, was issued.

The war against China in 1894-95 was brought to a successful finish under his administration. He was largely responsible for the Japanese alliance with Great Britain, 1902; and through his diplomacy Japan obtained control of the foreign affairs of Korea, where Ito was appointed resident general in 1906. Next year he was made a prince. He was assassinated at Kharbin, Oct. 26, 1909. A Life by K. Hamaka appeared in 1937.

It's Never Too Late to Mend. Novel by Charles Reade, first published in 1856, with the sub-title *A Matter of Fact Romance*. Full of passionate purpose in its exposure of the evils of prison life in England and Australia, the story is somewhat melodramatic. Its realistic presentation of the life of the Australian goldfields, vivid descriptions, and general vigour gave the book great popularity, which was shared by the author's dramatised version produced at The Princess's, Oct. 4, 1865.

Iturbide, Augustin de (1783-1824). Emperor of Mexico 1822-1823. Born at Valladolid (later Morelia), Sept. 27, 1783, he was the son of a nobleman who had recently migrated from Navarre. As a youth he entered the army, and fought for the Spaniards in the insurrection of 1810. In 1815 he was for a short time governor of the provinces of Guanajuato and Michoacan, and then left the army.

When the constitution of 1812 was proclaimed in 1820 he was given command of the Spanish army of the south, but at once began intriguing with the revolutionaries, and in 1821 issued a proclamation, the plan of Iguala, demanding complete independence. He forced the viceroy to sign a treaty agreeing to the plan, and was proclaimed



Prince Ito,
Japanese statesman

emperor as Augustin I, May 18, 1822. His despotic rule led to rebellion and in March, 1823, he abdicated and went to Europe. He returned to Mexico in July, 1824, but having been outlawed was arrested, and shot at Padilla, July 19. *Pron.* Ee-tur-beeday.

Iturea. An ancient division of Syria, between Damascus and Lake Tiberias and bordering on Arabia. The Itureans were Arabians and a warlike people. Many entered the Roman army as archers, afterwards forming cohorts and the Iturean guard. *See* Syria.

Itzehoe. A town of Holstein, Germany. On the navigable river Stör, it is 32 m. N.W. of Hamburg, amid the fertile Wilster marsh; it is a rly. junction, port, and the seat of numerous hospitals and sanatoria. Nets, soap, machinery, cement, wood, sugar, and a cattle market provide the industries. Itzehoe developed around a castle built by Charlemagne against the Danes, had urban rights from 1238, and from 1835 to 1864 was capital of Holstein. Pop. 21,435.

Ivan or John. Name of several rulers of Russia. Ivan I was grand duke of Moscow, 1328-41, under the suzerainty of the khan of the Tartars. He transferred the metropolitan see from Vladimir to Moscow, and was the first to attempt to unite the smaller states of Russia. *Pron.* Ee-valn.

Ivan III (1440-1505). Grand duke of Muscovy 1462-1505, surnamed the Great. The real founder of the tsardom of Muscovy, he made himself independent of Tartar control, greatly extended his territories, organized civil and military affairs, and drew up a *sudebnik* or code of laws supplementing the code of Yaroslav. He also entered into commercial and diplomatic relations with the Western powers. He married Sophia Palaeologus, niece of the last East Roman emperor, from which time the two-headed eagle appeared in the Russian arms.

Ivan IV (1530-84). A tsar of Russia 1547-84, surnamed the Terrible. Grand duke from 1533, he threw off the regency at 14 and on Jan. 16, 1547, was proclaimed tsar, the first Russian to assume that title. He made himself master of Kazan, Astrakhan, and W. Siberia, and did his utmost to undermine the influence of the boyars. But



Ivan the Terrible,
Tsar of Russia



A. de Iturbide,
Emperor of Mexico

attempts to obtain possession of the Baltic provinces were frustrated by the opposition of Sweden, Denmark, and Lithuania. Ivan was the first Russian ruler to conclude a treaty with England.

Soon afterwards Ivan withdrew from Moscow and lived in retirement, surrounded by his *oprichniki* or bodyguards, varying a life of cruelty and debauchery with strict religious observances. Towards the end of his reign hostilities with Sweden, Norway, and Poland would have cost him the throne had not Gregory XIII intervened. In a fit of passion he killed his son Ivan in 1580, and remorse for the deed is said to have hastened his end, which came on March 18, 1584. A Life by Stephen Graham appeared in 1932.

Ivanhoe. Tenth of the Waverley novels and the first in which Scott laid the scene outside Scotland—in Yorkshire and Leicestershire. The period is that of the return of Richard I from the holy land. The character drawing, the thrilling descriptions of the tournament at Ashby-de-la-Zouch, and the scenes in Sherwood make this dazzling panorama of feudal England a lasting favourite. Published in Dec., 1819, the novel has provided material for seven dramas, seven operas—one by Sullivan—and two extravaganzas.

Ivanov, VIACHESLAV IVANOVICH (1866–1949). Russian poet. Born in Moscow, he studied in Berlin under Mommsen, and in Geneva, Athens, Rome, and London. Works on early Greek religion appeared in 1904. Then he became a leader of the Russian symbolist movement, publishing from 1909 a series of books of poetry highly influential in Russia. Several of his poems were in praise of the N. Cornish coast; he also translated into Russian Dante, Petrarch, and Byron. He held the chair of classical philology at Baku, 1920–24, when he was allowed to leave Russia. He settled in Rome, where he died July 17, 1949.

Ivanovo. Town of R.S.F.S.R. It is in the region of Ivanovo, 65 m. N.E. of Vladimir, on the Uvod. It is on the rly. from Moscow to Kineshma, and is also linked by rly. with Gorky. Ivanovo on the N. bank of the river and Voznesensk on the S. bank were incorporated as one town in 1871. It has been called the Russian Manchester. There are calico printing and chemical and machinery works in the town; also large cotton factories and ironworks in the town and the immediate

neighbourhood, which is among the most important manufacturing centres in Russia. Pop. 285,000.

Iveagh, EDWARD CECIL GUINNESS, 1ST EARL OF (1847–1927). British brewer and philanthropist. Born Nov. 10, 1847, a younger son of Sir Benjamin Guinness, he was educated at Trinity College, Dublin, and joined the great Dublin firm, becoming its head on the retirement of his elder brother, Lord Ardilaun. He established in 1889 the Guinness Trust for building houses in London and Dublin, subscribed £250,000 to the Lister Institute, and paid for various improvements in the Irish capital. In 1908 he was made chancellor of Dublin university. In 1885 he was made a baronet, in 1891 a baron, in 1905 a viscount, and in 1919 an earl. His sons, Rupert (*v.i.*) and Walter, were both noted oarsmen at Eton and Cambridge, afterwards sitting in the house of commons. Lord Iveagh died on Oct. 7, 1927. By his will, which was proved at £11,000,000, he left Ken Wood (*q.v.*), Hampstead, with a magnificent collection of pictures, to the nation.

Rupert Edward Cecil Lee Guinness (b. March 29, 1874) succeeded to the title. He was Unionist M.P. for Haggerston 1908–10; S.E. Essex, 1912–18; Southend, 1920–27. When he went to the lords his seat at Southend was held from 1927 to 1935 by his wife Gwendolen, daughter of the 4th earl of Onslow. He was chairman of the firm of Guinness and chancellor of Dublin university. *Pron.* Ivah.

Ivel. A river of Somerset, England, which is sometimes known as the Yeo. It is a tributary of the Parret, and Yeovil is the most important town on its course.

Ives, FREDERIC EUGENE (1856–1937). American inventor. Born Feb. 17, 1856, and apprenticed in his youth to a printer, he became manager of the Cornell university photographic laboratory, where in 1878 he invented a half-tone photo engraving process from which he evolved in 1886 the process now generally employed. He also invented the three-colour process of colour printing, which revolutionised the art printing industry. He died in Philadelphia, May 27, 1937.

Ivinghoe. A market town and parish of Bucks, England, 4 m. from Tring rly. station and 2 m. from Cheddington station. Its 13th century church, a cruciform edifice dedicated to S. Mary, is noteworthy. There is a market house, and cattle fairs are held.

A Benedictine nunnery stood here before the Reformation. It is supposed that from here Scott took the name of Ivanhoe. Ivinghoe Beacon (*see* Chiltern Hills illus.) is near by. Pop. (1951) parish, 807.

Iviza, IBIZA, or IVIÇA. Spanish island in the Mediterranean, most westerly of the Balearic Is., 59 m. E. of the Spanish coast. It is hilly and wooded, with an indented coast, a good climate, beautiful scenery, and fertile soil, and produces corn, oil, figs, prickly pears, almonds, salt, charcoal, and lead. The pop. is scattered, the only important town being Iviza, the capital. The island was formerly celebrated for its pine trees, and with the neighbouring I. of Formentera was known to the ancients as Pityusae (pine islands). Area 230 sq. m. Pop. (1950) 35,312.

Iviza OR LA CIUDAD. Capital of Iviza, Balearic Islands. It has an old castle built by Philip V, and a 13th-century cathedral. Iviza, the ancient Ebusus, exports fruit, salt, and lead, and makes hosiery. Pop. (1950) 12,283.

Ivory. Name given to a variety of dentine or tooth substance of various animals. Ivory proper is usually restricted to that obtained from the tusks of elephants, but that from the hippopotamus, narwhal, and walrus, is also recognized. The finest comes from the tusks of the African elephant, it is whiter and of greater density than any other, and tusks weighing over 200 lb. each have been obtained. The tusks of the Indian elephant are considerably smaller, the average weight being 50 lb. These are the two chief sources of the ivory of commerce, but much is obtained from the tusks of fossil elephants from Siberia, China, etc., and the teeth of walruses, etc. Nearly all the world's ivory supply is marketed in London, Liverpool, and Antwerp.

Ivory, on account of its hardness, whiteness, durability, and ability to take a high polish, has been from the earliest times a favourite article of ornament. Though not easy to cut, it can be sawn and filed, and softened and made flexible by immersion in phosphoric acid and afterwards in hot water. It can be dyed by various chemical means, but no method has yet been discovered of restoring its colour when yellowed with age. Its principal commercial use is for ornamental carving, piano keys, billiard balls, knife handles, and toilet ware.

The steadily increasing demand for ivory and the decreasing supply



Ivory. A consignment from Uganda: some of the tusks are 10 ft. long and weigh 140 lb.

have resulted in the manufacture of a variety of substitutes, as well as in the use of vegetable ivory (*see* Ivory Nut). But no substitute has the resonance and the "live" feel, or takes the peculiar high polish, of ivory.

Ivory Black. A pigment prepared by calcining ivory in a closed crucible. The access of air must be prevented or the ivory will be reduced to a white powder. The material used is the waste resulting from ivory working. This is a rare pigment, most so-called ivory blacks being the finest varieties of bone-blacks.

Ivory Coast (Fr. Côte d'Ivoire). French territory in West Africa. It is bounded N. by the French territories of Upper Volta and Sudan, W. by French Guinea and the republic of Liberia, E. by Ghana (formerly the British Gold Coast colony), and S. by the Gulf of Guinea. The area in 1956 was 124,500 sq. m., and the est. pop. 2,500,000, of whom 15,000 were French and 2,000 foreigners. The African peoples of the territory include the Agni, of the same family as the Ashanti; Mandingos, most of whom follow Islam but preserve many heathen practices; Baoules, Gouros, and, in the S.W., Kru.

The highest part of the territory lies in the W., where on the borders of Liberia Mount Nimba rises to more than 6,000 ft. The coastal regions are broken by lagoons, used by small steamer and motor vessels in coasting trade. Rains are heavy from April to July in the S., from June to Sept. in the N.

Mahogany is extracted from the forests, some 74,000 sq. m. in extent; gold is found near Bouaké, 200 m. N. of the coast; and there

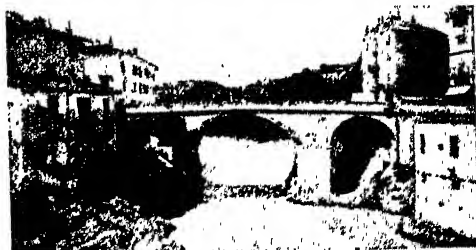
are manganese deposits. The coastal areas are subject to sleeping sickness, but in the interior highlands cattle, sheep, and pigs are reared. Principal crops are ground nuts, maize, millet, rice, bananas, pineapples, and other fruits, coffee, and cocoa. Exports, which exceed imports in value, include coffee, cocoa, bananas, and timber; imports include cement, textiles, metal goods, and motor fuel; the greater part of the external trade of the Ivory Coast is with metropolitan France. Abidjan, Sassandra, and Tabou are the chief ports; the major airports are at Port Buet, for Abidjan, and Bouaké.

The territory is administered by a governor assisted by a privy council and an elected assembly; it is represented in Paris by two members of the national assembly, three of the council of the republic; and four in the assembly of the French Union. Abidjan (pop. 128,000, including 9,000 Europeans), the capital, is connected by rly. with Ouagadougou, the capital of Upper Volta territory. France obtained rights on the coast in 1843 but did not occupy the interior until 1882.

Ivory Nut or VEGETABLE IVORY (*Phylloelephas macrocarpa*). Dwarf tree of the family Palmae, native

to the north of S. America. The greater part of the trunk (perhaps 20 ft.) lies along the ground, with only a few feet vertical. It is crowned by grand feather-like leaves, 15 ft. to 20 ft. long. The male plant grows taller than the female, and the flowers are crowded around a long, drooping stalk (spadix), so that they resemble a catkin. In the female plant the spadix bears only six or seven flowers, which are succeeded by a cluster of plum-like fruits consisting of a sweet yellow pulp, enclosing from six to nine seeds, and covered with hard protuberances. The seeds, at first milky, harden into the vegetable ivory used as a substitute for the elephant's tusk in making chessmen, reels, knobs, toys, etc.

Ivrea. City of Italy, in the prov. of Turin. It stands on the Dora Baltea, 38 m. N. of Turin. The restored cathedral dates from 973-1005. The 800-ft. high hill on which Ivrea stands is crowned by the Castello delle Quattro Torri, 1358, used as a prison; only three of its lofty brick towers remain standing. There are iron and dye



Ivrea, Italy. Roman bridge across the river Dora Baltea

works; cotton and silk goods are made, and there is trade in cereals, fruit, and wine. Colonised by the Romans about 100 B.C., Ivrea contains ruins of an ancient theatre. It fell to the French in 1554, 1641, and 1704. It is the ancient Eporedia. Pop. (1951) 17,923.

Ivry, BATTLE OF. Fought between Henry IV of France and the forces of the Catholic League, March 13, 1590. Henry, fighting for his throne, was besieging Dreux when the Leaguers, under the duke of Mayenne, marched towards him. With them was a contingent of Spaniards from the Netherlands, and Henry prepared to meet them on the Eure, 42 m. W. of Paris, near Ivry (renamed Ivry-la-Bataille).



Ivory Nut. Foliage and fruit, with open nut on right

Henry arrayed his infantry, Germans and Swiss among them, in line. Some he placed in front, with the artillery; behind were horse and foot intermingled on a regular plan, Henry being with the horse in the centre. Mayenne's troops crossed the Eure, and his Spanish horse charged, but on the wings the Leaguers met with no success. In the centre they almost overwhelmed Henry, but the king rallied and personally led a fierce charge against Mayenne's infantry, who broke before the shock. The fight was almost entirely a cavalry engagement. The king ordered his men to spare the French, but to slay all foreigners except the Swiss, who were present on both sides. Henry is estimated to have had about 11,000 men against 22,000. The battle is the subject of a ballad by Macaulay.

Ivry-sur-Seine. A suburb of Paris, in the dept. of Seine. It lies on the left bank of the Seine, 4½ m. S.S.E. of Paris, immediately outside the fortifications, and is connected with the city by electric rly. On the river bank, above the Pont de Conflans, is a harbour for river traffic, the Port d'Ivry. Fort d'Ivry forms part of the Paris fortifications. Pop. (1954) 47,765.

Ivy (*Hedera helix*). A climbing shrub of the family Araliaceae, native of Europe, N. Africa, and Asia. In old specimens the trunk may be as much as 1 ft. thick. Ivy reaches to the tops of tall trees and buildings, clinging to its support by peg-like rootlets. The thick, glossy leaves have five lobes, which vary greatly in depth and the acuteness of their points; the upper leaves are oval or heart-shaped, without lobes. The yellow-green flowers grow in umbels, and are produced from Sept. to Nov. The fruit is a small, dull bluish-black berry.

Variegated ivies are useful in gardens to cover ugly corners, and to trail over tree stumps, etc. They should be planted in autumn in ordinary rich soil. When a check in growth or habit is desired it should be effected by vigorous pruning with shears in early spring. Ivy may destroy trees if allowed to grow over them unchecked for a considerable period. See Inflorescence.



Ivy. Foliage and flowers of this climbing shrub

Ivybridge. Village of Devon, England. Situated near Dartmoor, about 10 m. E.N.E. of Plymouth, it is served by railway. Agriculture and dairy farming are the chief industries, but there are also paper mills. It is a hunting centre and a resort. Pop. (1951) parish, 1,852.

Iwakura, TOMOMI, PRINCE (1835-83). Japanese statesman. Born in Kyoto, of noble family, he held a court position, and was at first opposed to all foreign influences; but in 1868 he took an active part in the revolution which brought the progressive party into power. To his efforts was due the abolition of the feudal system, while as foreign minister he showed great shrewdness and ability, although it is reported that he never saw a foreigner until he was of middle age. His embassy to the Western powers in 1872 to explain the aspirations and new conditions in Japan was brilliantly executed, though it met with scant success. He was a strong advocate of peace.

Iwojima. Centre island of the three that comprise the Volcano Is. in the Pacific Ocean, 750 m. S. of Tokyo. A small, bare, leg-of-mutton-shaped island, 5 m. long, covered with volcanic ash, it was occupied in 1891 by the Japanese, who developed its sulphur mines.

During the Second Great War Iwojima was a Japanese air base.

U.S. carrier-borne aircraft attacked the island on June 23, 1944, and thereafter it was subjected to periodic naval and air bombardment. In 1945 it became necessary to secure Iwojima because Japanese aircraft operating from it were intercepting U.S. super-fortresses in passage between the Mari-

anas and Japan. After a three days' bombardment of the island from the sea and the air, U.S. marines landed on Feb. 19, 1945, to meet on the shelterless beaches much stiffer opposition than had been expected. Mt. Suribachi, 500 ft., keypoint in the defence and highest point on the island, from which every movement of the invaders could be observed, was taken after hard fighting on the 23rd; but not until March 16 did organized resistance end, the Japanese defending every cave—and the island was full of them—to the death. U.S. marine casualties

were 4,189 dead, 441 missing, 15,308 wounded. Japanese losses were estimated at 21,000, plus 700 prisoners.

The capture of Iwojima made possible a fighter escort for super-fortresses raiding Japan, and a landing ground for damaged U.S. aircraft returning to the Marianne Is. from Japan. See Pacific War.

Ixelles (Flemish Elsenne). Suburb and commune of Brussels, Belgium. It lies to the S.E. of the Boulevard de Waterloo, adjoining the Quartier Léopold on the N.E.

Ixia. Genus of bulbous herbs of the family Iridaceae, natives of S. Africa, with narrow sword-shaped leaves, and spikes of showy, salver-shaped, tubular flowers, varying through white, pink, and rose to dark red and blue, or cream colour to orange.



Ixia. Flowers of this South African herb

Ixiolirion montanum. Bulbous herb of the family Amaryllidaceae. A native of Asia, it has grass-like leaves and a spray of trumpet-shaped blue flowers. There are several garden varieties.

Ixion. In Greek mythology, king of the Lapithae in Thessaly. Having murdered his father-in-law, he was taken to heaven by Zeus for purification, no mortal



Ixion bound to his wheel in the nether world
From an old engraving

being able to purify him. For attempting the virtue of Hera, wife of Zeus, he was condemned to be bound to a continuously rolling wheel in the nether world.

Ixora. Large genus of shrubs of the family Rubiaceae. They are native to the tropics, chiefly of Asia and Africa. They have leathery, opposite leaves, and clustered, showy, tubular flowers of white, pink, salmon, orange, or crimson, often fragrant. *I. coccinea* is credited with medicinal properties by the people of India, who use the beautiful flowers as offerings to one of their deities.

Ixtaccihuatl (white woman). Extinct, snow covered volcano of Mexico, in the state of Puebla. It is 40 m. S.E. of Mexico City and on the S. adjoins Popocatepetl, being connected by the saddle of Tlamacas. Its profile as seen from Mexico City resembles a woman reclining in a white shroud. Its alt. is about 17,000 ft., and the ascent is rarely accomplished.

Iyar. Second month of the Jewish year, corresponding approximately to May.

Izalco. Volcano in the republic of Salvador, about 6,000 ft. high, and the most active volcano in Central America. Much of the time its flames illumine the countryside and are marked by vessels on the Pacific as a natural guide.

Izhevsk. Capital of Udmurt A.S.S.R., R.S.F.S.R. On the river Izha, 150 miles S.W. of Perm, it has a metallurgical industry that began with the making of firearms in 1760. It produces steel used in making machine tools, motor cycles, agricultural implements, and other machines. Pop. (est.) 200,000.

I Zingari (Ital., the gipsies). Touring cricket club, often referred to as I.Z. It was founded in 1845, playing some of its early matches at Canterbury, where the Old Stagers (closely associated with I.Z.) still take part in the annual cricket week. Members in a normal season play about 30 matches, although they have no home ground. *Pron.* ee zing-g'ri.

Izmail. Town of Ukraine S.S.R., capital of Izmail region. On the left bank of the N. arm of the Danube delta, it is a port and a fishing centre, produces caviare, and trades in cereals and wood. Once a Turkish fortress, it was three times taken by the Russians, handed over to Rumania in 1856, incorporated with Russia by the treaty of Berlin in 1878, ceded to Rumania as a result of the First Great War, and after the Second again ceded to Russia. Pop. (est.) 26,000.

The region of Izmail, the south part of former Bessarabia, was created in 1940; it lies between

the Kilia (N.) arm of the Danube delta and the Dniester, and is an agricultural district producing grain, sheep, and fruit. On the coast there are fisheries and salt works. Area 4,800 sq. m. Pop. (est.) 700,000.

Izmir. Turkish form of Smyrna, name of an ancient city and seaport of Asia Minor (Asiatic Turkey). Standing on the W. coast, at the head of the Gulf of Izmir (which penetrates 46 m. inland from the Aegean Sea), it lies at the foot of Mt. Pagus, here crowned by the ruins of the ancient Greek acropolis; it is the capital of the vilayet of the same name (formerly part of Aidin).

Smyrna was founded by Greek colonists about 1000 B.C., and was one of the seven cities associated with Homer. Destroyed by the Lydians in 627 B.C., and restored by Lysimachus three centuries

later, it became a prosperous city under the Romans. During the Middle Ages it was frequently sacked by the Turks; partly occupied by the Knights of Rhodes in 1344; destroyed by Tamerlane in 1402; and captured by the Turks in 1424.

a centre of the tobacco industry, and exports corn, raisins, figs, wool, skins, oil, and silk; it has carpet, cotton, silk, and soap factories, tanneries, sawmills and flour mills. Pop. (1955) town, 286,310; vilayet 898,430.

Izmir, GULF OF (anc. Smyrnaeus Sinus). Bay of Asiatic Turkey. It is 46 m. long, and 13 m. wide at its mouth. Izmir port lies at its inmost point.

Izmit (anc. Nicomedia). Town of Asiatic Turkey, capital of Kocaeli vilayet. About 50 m. S.E. of Istanbul near the head of the gulf of Ismit, it is connected with Uskudar by rly. The seat of a Greek and of an Armenian bishopric, it contains a fine 16th-century mosque. Izmit was once the capital of the kings of Bithynia and a flourishing city. Tobacco cultivation is important in the vilayet. Pop. (1955) 55,116.



Izmir, or Smyrna, Turkey. General view, from the south, of this port and city of Asia Minor, which was founded by the Greeks about 1000 B.C.

later, it became a prosperous city under the Romans. During the Middle Ages it was frequently sacked by the Turks; partly occupied by the Knights of Rhodes in 1344; destroyed by Tamerlane in 1402; and captured by the Turks in 1424.

One of the seven churches mentioned in the Book of Revelation, it has been associated with Christianity from the beginning, and was formerly the seat of Roman Catholic, Greek Orthodox, and Armenian archbishops.

The commercial prosperity which Smyrna enjoyed during the 19th century was greatly reduced by the Balkan Wars, 1912-13, and the First Great War. Occupied by the Greeks in 1919, it was retaken by the Turks, Sept. 9, 1922. Four days later a great fire destroyed three-fifths of the town. The new city, of wide streets, gardens, and squares, is an important rly. terminus. Possessing a fine harbour, it is

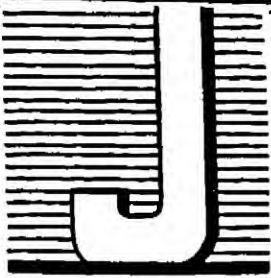
Izu-Shichito OR THE SEVEN ISLANDS OF IZU. Group of islands forming part of Japan proper. They extend south into the Pacific Ocean, south of the entrance to Tokyo Bay. Oshima or Vrios Island, the largest, is about 10 miles at its widest; others are Toshima, Niihima, Kozushima, Miyake, Mikura, and Hachijo; also several small islets. All are of volcanic origin; Mikura, 2,500 ft. high, on Oshima, is subject to frequent eruptions.

Izvestia (Russian, news). The newspaper and official organ of the supreme soviet of Russia. Founded in 1917, it appears six days a week, and is distributed in all main cities and country districts of the U.S.S.R. It publishes laws and decrees and official announcements.

The first pages are devoted to official matter; then come articles on foreign affairs, cultural articles, stage and film criticisms, etc. There are no advertisements.

THE history of the letter J is a short one.

This relatively modern offshoot of the letter I was unknown in any alphabet until the 14th century, when it originated in the ornamental lengthening of the letter I in MSS., particularly when it was an initial letter. The descendant stroke of the pen was made to taper away to the left. It happened that such an initial commonly indicated the consonantal sound of *y*, as in *yellow*; that is to say, the Latin pronunciation of either *Iulius* or *Julius* was as though spelt *Yulius*. Gradually the two letters I and J were differentiated to represent vowel and consonant respectively, though the



process of differentiation was slow. The letters were not separated in English dictionaries until the 17th century.

Whereas the minuscule, or lower case, *j* of modern type is derived directly from medieval MSS., the capital letter is virtually a printer's invention, and something of a makeshift. As with the capital U, there was no Roman model for the typographers to emulate, and both these letters are markedly inferior in design to the rest of the alphabet, lacking as they do the individual and collective balance, boldness, and dignity of the classic Roman capital letters.

J Tenth letter of the English and Latin alphabets. In the latter it is merely another form of I, which was both a vowel and a consonant (*y*). Its English value is that of *g* in *gem*. In French it is sounded approximately like English *si* in "fusion"; in Spanish like English *h*; in German like English initial *y*. See Alphabet; Phonetics.

Jabberwock. Mythical creature in a poem in Lewis Carroll's *Through the Looking Glass*. This poem, *Jabberwocky*, which puzzles Alice and is explained to her by Humpty Dumpty, has added to English slang some of its many nonsense words, e.g. *chortle*.

Jabbok (mod. Nahr ez Zerka). Stream in Gilcad, in ancient Palestine. One of the tribs. of the Jordan, and 110 m. long, it formerly separated the kingdom of the Amorites from that of Bashan, and had many associations with Jacob. His wrestling with the angel took place on its bank (Gen. 32).

Jabesh-Gilead. One of the chief cities in Gilead. Its inhabitants were slain for refusing to help the Israelites against the Benjamites (Judges 21), and Saul and his sons were buried close by the city (1 Sam. 31).

Jabiru (*Mycteria*). A genus of large birds of the stork family. They are found in India, Africa, Australasia, and S. America. Some

have almost naked heads and necks, and the beaks are large and massive. The legs are long, the toes comparatively short. The American species has white plumage, the African black and white, and the Indian glossy plumage with a metallic sheen.



Jabiru, the South American species

Jablonec (Ger. Gablonz). Town of Czecho-Slovakia. Situated on the Nisa (Neisse) river, 7 miles E.S.E. of Liberec (Reichenberg), in Sudetenland, it is a manufacturing centre. Pop. (est.) 25,000.

Jablonitz Pass (Czech. Jasini; Mag. Korosmezo). One of the chief passes of the Carpathians. On the Czech-Polish boundary 1919-39, after the Second Great War it lay in Ukraine. It is 3,300 ft. a.s.l. and is traversed by a rly. In the First Great War the pass was the gateway from Russia to the Hungarian plain. Fighting took place here between the Austrians and the Russians in 1915-16, and in the campaign of the Austro-German army against Rumania, December, 1916-March, 1917.

Jaborandi (*Pilocarpus microphyllus* and *P. pennatifolius*). Brazilian plants from whose leaves is prepared the nitrate of an alkaloid pilocarpine. Preparations of pilocarpine stimulate the growth of the hair. Applied to the eye, pilocarpine causes contraction of the pupil.

Jaca. City of N. Spain, in the prov. of Huesca. On the southern slopes of the Pyrenees, 2,400 ft. above sea level, it is 114 m. by rly. N. of Saragossa. An episcopal see, it has a fine 11th century cathedral. It was the capital of the county of Sobrarbe, from which originated the kingdom of Aragon. Pop. 6,900.



Jacamar of S. America

Jacamar (*Galbulidae*). Bird of tropical South America, related to the woodpecker. Somewhat resembling a large humming-bird, it has beautiful plum-

age, reflecting metallic hues. It feeds chiefly on insects, and nests in holes in river banks.

Jacaná (*Parridae*). Group of birds found in India, Australasia, and the tropical regions of Africa



Jacaná. Long-toed aquatic bird of the Tropics

and America. Including about ten species, birds of this group resemble coots, but are remarkable for their long legs and the extraordinary length of their toes, which enables them to walk on the floating leaves of large water-lilies. They feed upon insects, and make nests which float on the water or are placed near it. The birds fight con-

stantly among themselves.

Jachin (Heb., he shall establish). Name given to the fourth son of Simeon (Gen. 46, Ex. 6); and one of two symbolical bronze pillars which stood in front of Solomon's temple (2 Chron. 3). See Boaz.

Jacinth (Fr. *jacinthe*). Alternative name for a variety of zircon also known as hyacinth (*q.v.*).

Jack. A word used in many senses, some of which are noted separately. The most common is as a familiar term of endearment in lieu of John, derived from Jacken, a variant of Jankin, the regular diminutive of John. This nominal use appears in Jack Tar—the latter word an abbreviation of tarpaulin, in reference to the seaman's oilskins—Jack in the Green, Jack-a-dandy (a fop); Jack-sauce (an impertinent rascal); Jack Fool, Jack-a-Lantern (an *ignis fatuus*, also personified as Will o' the Wisp); Jack Frost, Yellow Jack (Yellow Fever), Jack-of-all-trades, steeple-jack, cheap-jack, and many others.

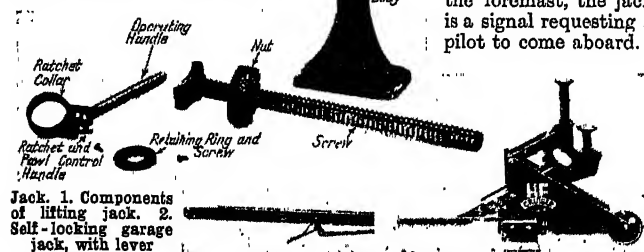
In an easily derived sense the word is applied to things which supplied the place of a boy-help, e.g. a boot-jack, roasting-jack to turn a joint, smoke-jack, and

thence to other purely mechanical appliances, such as the apparatus for raising weights (*v.i.*) and the upright rod which carries the quill or other plectrum that plucks the strings of a harpsichord. Its other use as a diminutive is equally easily explicable, as for a young, or small, pike, the small ball used in the game of bowls, and perhaps for the short beam known as a jack-rafter.

Jack is a more recent name than knave for the lowest ranking picture card in each suit of playing cards, but as knave in the Middle Ages was used for a male child as well as a rascal, while jack in Shakespeare's day might mean a low fellow or menial, the similarity is apparent.

From yet another source, from a word found in French as *jaque*, in Italian as *giaco*, in Spanish as *jaco*, in Dutch as *jak*, and in German as *jacke*, comes the English jack, meaning a coat of mail, then a short military coat worn over the coat of mail, and thence the familiar jacket (*q.v.*). By extension the word was applied to other articles of military apparel, *e.g.* the jack boot, and comprehensively to a soldier fully equipped, termed a jackman.

Jack. Mechanical device for raising weights through a distance, so called because it supplies the place of an assistant.



The most common type lifts a motor vehicle from the ground. Various principles are employed: ratchet and lever, screw spindle and bevel gearing, and oil hydraulic. Many vehicles have permanent hydraulic jacks fitted to their underframe. Another manual jack is used on railways to raise the track when packing ballast under sunken sleepers. To lift heavier objects there is a hydraulic jack, which is in effect a small hydraulic press.

Jack. A flag which is used at sea as a signal or mark of distinction. Specifically it is the small flag worn on the jack-staff at the bow of a ship by which nationality is indicated. Since the early 17th



Jackal. Specimen of the black-backed African variety

century, except during the Commonwealth, the jack on British ships has been a small Union flag of the period; and since 1707 a small Union flag has been inserted in the upper canton of ensigns worn by the Royal Navy and merchant navy. It is quite incorrect to refer to this flag as the Union Jack when it is not worn as a jack. The origin of the name is obscure, but it is popularly supposed to be derived from Jacobus, the Latin form of James, which was the name of the king of England and Scotland at the time when this flag was introduced into the navy. Every maritime nation has its own jack. In some countries, *e.g.* France and the Netherlands, it is a small replica of the ensign. The U.S. navy uses a blue flag with a white five-pointed star for each state. Worn at the foremast, the jack is a signal requesting a pilot to come aboard.

related to the wolves, but are much smaller and have short, bushy tails. The Egyptian jackal is the largest, being about 50 ins. in total length and 16 ins. high at the shoulder. The Asiatic jackal is seldom more than 26 ins. long in the body. The general colour is brown of various hues. Jackals roam mainly at night and feed upon carrion and small animals, sometimes upon fruit and sugar-cane. They are useful as scavengers, and are said to breed freely with domestic dogs.

Jackass. Male of the domesticated ass or donkey, believed to have originated from the Nubian ass (*Equus africanus*), whose characteristic markings are still evident in the longitudinal stripe along the back and the cross-stripe at the shoulders. Tegetmeier mentions an ass, living in 1893, that had been ridden 55 years earlier. This longevity probably gave rise to the myth that no one ever saw a dead donkey. Laughing Jackass (*q.v.*) is the popular name for an Australian bird (*Dacelo gigas*) of the kingfisher family.

Jack Boot. High riding boot of the 17th century. It reached above the knee, and had a large piece of leather covering the instep. It was superseded by a similar boot, cut away at the top, introduced by the duke of Wellington. A modified jack boot is still worn by fishermen. See Boot.



Jack Boot of 17th century
S. Kens. Museum

Jackdaw (*Corvus monedula*). A bird of the crow family, common in Great Britain. Much smaller than the rook, it may be recognized by its greyish neck, white eye, and smaller beak. It is commonly found about castles and church towers, where it builds its nest in holes in the masonry. It feeds mainly on worms, grubs, and insects. It is easily tamed, but mischievous.



Jacket. Upper garment with sleeves and fastening down the front. The word is derived from French *jaque*, coat of mail, later applied to a short

Jack, RICHARD (1866-1952). British artist. Born at Sunderland, Feb. 15, 1866, educated at York school of art, at S. Kensington, and in Paris, he first exhibited at the R.A. in 1893. In 1912 his *Rehearsal with Nikisch* was purchased by the Chantrey trustees. String Quartette won a silver medal at Pittsburgh, 1914, in which year he was elected A.R.A. He became R.A. in 1920. In his later years he gained a reputation in Canada as a portrait painter. Among his sitters were King George V and Queen Mary. He died at Montreal, June 30, 1952.

Jackal (*Canis aureus*). Animal of the dog tribe, common in Africa and S. Asia. Jackals are closely

military coat or tabard worn over the armour. (*See Costume.*) In engineering the term is applied to clothing, i.e. the covering of thin sheet iron or steel over the lagging of a locomotive boiler, cylinder, or other surface protected against radiation of heat; also to the outer casing or pipe enclosing a steam pipe lagged against radiation.

Jacks. LAWRENCE PEARSALL (1860–1955), British theologian. Educated in Nottingham, his birthplace, he graduated at University



L. P. Jacks,
British theologian

College, London. After studying in Germany, he became in 1887 assistant to Stopford Brooke, whose daughter he married, and was afterwards a Unitarian minister. In 1903 he became professor of philosophy at Manchester College, Oxford, and was its principal 1915–31. The first editor of *The Hibbert Journal*, 1902–47, he published *All Men Are Ghosts*, 1913; *From the Human End*, 1916; *Life and Letters of Stopford Brooke*, 1917; *The Inner Sentinel*, 1930; *The Confession of an Octogenarian*, 1942; and several books about Smokeover (Manchester). He died at Oxford, Feb. 17, 1955.

His son Maurice Leonard (b. 1894) was educated at Bradfield and Balliol College, Oxford, and was fellow, tutor, and dean of Wadham College, Oxford, 1919–22. Headmaster of Mill Hill, 1922–37, he returned there during 1943–44. From 1938 he directed the Oxford univ. dept. of education.

Jackson. A city of Michigan, U.S.A., the co. seat of Jackson co. It stands on the Grant river, 76 m. W. of Detroit, and is served by rlys. and an airport. The trading and distributing centre of an area producing grain, fruits, and vegetables, it has also rly. repair shops and plants making motor car and aeroplane parts, tires and tubes, refrigerators, machine tools, castings, and furniture. The Republican party was founded at a state convention here on July 6, 1854. Named after President Andrew Jackson, settled in 1829, Jackson was incorporated 1843, became a city 1857. Pop. (1950) 51,088.

Jackson. City of Mississippi, U.S.A.; state capital and largest city and a co. seat of Hinds co. It stands on the Pearl river, 45 m.

E. of Vicksburg, and is served by the Illinois Central and other rlys. and an airport. Settled in 1820, Jackson was selected as the state capital the following year, and became a city in 1840. During the Civil War it was captured by the Federalists in 1863 and was to some extent destroyed by fire.

Jackson is the seat of several colleges and state institutions. There are new and old capitols, as well as the state historical museum, state library, and municipal art gallery. The oil industry flourishes in the surrounding area, and a natural gas field is being developed. The city processes lumber and cotton-seed oil and makes textiles, fertilisers, fluorescent lamps, bottles, and clothing. Pop. (1950) 98,271.

Jackson. A city of Tennessee, U.S.A., co. seat of Madison co. It stands on the Forked Deer river, 85 m. N.E. of Memphis, and is served by the Illinois Central and other rlys. and an airport. The seat of Union university, it contains also Lane college for coloured students. A large trade is carried on in cotton, maize, and fruit, and industrial plants include rly. workshops, cotton and cotton-seed oil mills, furniture and agricultural implement factories, the nation's largest skewer plant, one of the largest veneer plants, and others producing steel, petrol engines, hardware, varnish, cotton bags, and crates. The city uses power from the Tennessee Valley Authority. Settled in 1820, it became a city in 1845. During the Civil War it changed hands several times, and was a supply depot for Beauregard and headquarters for Grant. Pop. (1950) 30,207.

Jackson, ANDREW (1767–1845). 7th president of U.S.A. Born probably in Lancaster county, S. Carolina, March 15, 1767, of Scottish-Irish descent, he became a barrister. After a brief political life as member of congress, 1796–97, and senator, 1797–98, he engaged in business until 1811. In the war against Great Britain he gained a signal victory at New Orleans, Jan. 8, 1815. He crushed the Seminole Indians in 1818, great indignation being aroused in England by his execution of two British subjects on the charge of



Andrew Jackson,
American president

secretly encouraging the Seminoles. In 1821 he was made governor of Florida and during 1823–25 was a senator. An unsuccessful candidate for the presidency in 1824, he was elected as a democrat in 1828. In 1832 he was re-elected.

The definite establishment of the "spoils" system, by which existing officials were dismissed wholesale to make way for an incoming president's supporters, is attributed to Jackson, whose term is memorable for the bank war, caused by his veto of the bill for renewing the charter of the Bank of the United States and his instructions that public money deposited in the bank should be removed. This led to his censure by the senate, though the vote was afterwards erased. His threat to enforce the tariff laws at all costs had much to do with inducing the nullifiers to accept a compromise. Generally he opposed the growth of capitalism. After 1836 Jackson retired from public life. He died near Nashville, June 8, 1845. *Consult* Life, J. S. Bassett, new ed. 1916; *The Age of Jackson*, A. M. Schlesinger, 1945.

Jackson, SIR BARRY VINCENT (b. 1879). British theatre manager. Born in Birmingham, September 6, 1879, he founded its repertory company in 1913, producing over twenty plays within four months. After serving in the Royal Navy, he achieved a notable success with Drinkwater's *Abraham Lincoln*. In London he put on *Back to Methuselah*; *The Farmer's Wife*, 1924, which ran for three years; *The Immortal Hour*; *Yellow Sands*; *Six Characters in Search of an Author*; *The Apple Cart*; *The Barretts of Wimpole Street*; 1066 and *All That*, 1935. His published works include *The Theatre and Civic Life*, 1922. During 1929–37 he directed the Malvern summer festivals. A governor of the Old Vic and Sadler's Wells, he was director of the Shakespeare Memorial Theatre at Stratford 1946–48. Knighted in 1925. *See* Birmingham Repertory Theatre.

Jackson, SIR (FRANCIS) STANLEY (1870–1947). English cricketer. Born Nov. 21, 1870, he was the younger son of W. L. Jackson, of Leeds, who became



Sir Barry Jackson,
British theatre
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Lord Allerton. He was educated at Harrow and Trinity College, Cambridge. Captain of cricket at Cambridge, 1892-93, he became a regular member of the Yorkshire team. He played several times for England against Australia, being captain in 1905, and for the Gentlemen. "Jacker" was one of the finest all-rounder cricketers of the time, being almost invariably at the top of his form when the need was greatest. He served in S. Africa, 1900-02, and during the First Great War commanded a battalion of the West York-



F. S. Jackson,
English cricketer

shire Regt. He was M.P. for Howdenshire, 1915-26; chairman of the Unionist party executive, 1923-1926.

Knighted in 1927, Sir Stanley was governor of Bengal, 1927-32. In 1934 he was chairman of the M.C.C. selectors for test matches. He died March 9, 1947.

Jackson, FREDERICK GEORGE (1860-1938). A British explorer. Born March 6, 1860, at Alcester, Warwickshire, and educated at Denstone and Edinburgh University, he travelled in Australia, and in 1893 made a sledging expedition across the frozen tundra between the Ob and the Pechora in Asiatic Russia. In 1894 he was given command of the expedition organized by Alfred Harmsworth (later Viscount Northcliffe) to travel to Franz Josef Land and then attempt to reach the North Pole. Meeting Nansen in 1896 on his retreat from the Fram, Jackson abandoned his polar attempt and spent three years in Franz Josef Land. He saw service in the South African War and the First Great War.

During 1925-26 he visited the sources of the Zambezi, Nile, and Congo rivers, descending the whole length of the Congo to the sea. His publications included *The Great Frozen Land*, 1895; *A Thousand Days in the Arctic*, 1899; *The Lure of Unknown Lands*, 1935. He died in London on March 13, 1938. There is a memorial tablet to him in S. Paul's cathedral.

Jackson, HENRY (1839-1921). British scholar. Born at Sheffield, he was educated there, at Cheltenham College, and at Trinity College, Cambridge, of which he became fellow in 1864 and tutor in

1866. He was praelector in ancient philosophy from 1875 until 1906,



Henry Jackson,
British scholar

when he was made regius professor of Greek. During 1914-19 he was vice-master of Trinity. Jackson's writings are mainly translations of and comments on Aristotle and Plato; he also published *About Edwin Drood*, 1911. In 1908 he was given the O.M. He died Sept. 25, 1921.

Jackson, HOLBROOK (1874-1948). British writer. Born at Liverpool, Dec. 21, 1874, he became a journalist. Joint editor of *The New Age*, 1907, he later edited *T.P.'s Weekly*, and *Today*. He was long editorial director of the *National Trade Press*. His first book, *Edward Fitzgerald and Omar Khayyám*, appeared in 1899, and his literary studies included *Great English Novelists*, 1908; *The Eighteen Nineties*, 1913; *The Fear of Books*, 1932; *The Printing of Books*, 1938; *Bookman's Holiday*, 1945; *The Reading of Books*, 1946. He died June 17, 1948.

Jackson, SIR JOHN (1851-1919). British engineer. Born at York, Feb. 4, 1851, he studied engineering at Edinburgh University. He obtained his first contract in 1876, and in 1877 successfully completed, in quicksands, the Stobcross docks at Glasgow. Construction of Middlesbrough, Hartlepool, and N. Sunderland docks was followed by that of the commercial harbour at Dover and the extension seawards of the admiralty pier. Among his other important works were the last eight miles of the Manchester ship canal, the laying of the foundations of Tower Bridge, the deep lock at Barry, and the extension of admiralty works at Keyham. Jackson constructed the new naval harbour and graving dock at Simon's Town, Cape Colony, a rly. across the Andes, and the great Euphrates barrage near Babylon. He was knighted in 1895 and sat as Unionist M.P. for Davenport, 1910-18. He died Dec. 14, 1919.

Jackson, JOHN (1769-1845). English pugilist. The son of a London builder, he was born Sept. 28, 1769. Though champion 1795-1803,



John Jackson,
English pugilist

he appeared in the ring on only three occasions: when he defeated Pewterel of Birmingham at Smitham Bottom, near Croydon, June 9, 1788; at Ingatstone, Essex, against Ingleston, when he had to retire from the fight owing to a dislocated ankle, March 12, 1789; and his last fight, an easy victory over Mendoza (*q.v.*) at Hornechurch, April 14, 1795. After his retirement "Gentleman Jackson" became famous as a teacher of boxing, opening a school at 13, Bond St. Byron, one of his pupils, celebrated him in verse. He died Oct. 7, 1845.

Jackson, PETER (1861-1901). West Indian Negro boxer. Born July 3, 1861, in Puerto Rico, he became a seaman. His first fight took place in Sydney, where he eventually won the championship of Australia by beating Tom Lees in 1886. He then went to San Francisco and became boxing instructor at the Californian Club. In 1891 he fought his famous drawn battle of 61 rounds with Corbett. The crowning victory of his career was over Frank Slavin on May 30, 1892, at the National Sporting Club, London. He died in Australia, July 13, 1901.

Jackson, SIR THOMAS GRAHAM (1835-1924). A British architect. Born at Hampstead, Dec. 21, 1835,

son of a solicitor, he was educated at Brighton College and Wadham College, Oxford. He became a fellow of Wadham, and was trained as an architect under Sir Gilbert Scott. In 1861 he began to practise, and during the next fifty years was responsible for many buildings at Oxford, including additions to Brasenose, Lincoln, Corpus Christi, and Hertford colleges.

Among the many buildings he restored were Winchester cathedral, Bath abbey, Christchurch priory, and at Oxford the church of S. Mary the Virgin and the Bodleian. Jackson was elected A.R.A. in 1892 and R.A. in 1896. In 1913 he was created a baronet. His writings include *Modern Gothic Architecture*, 1873; *Byzantine and Romanesque Architecture*, 1913; *Gothic Architecture in France, England, and Italy*, 1915. He died Nov. 7, 1924.

Jackson, THOMAS JONATHAN (1842-63). An American soldier, known as Stonewall Jackson.



Sir Thomas Jackson,
British architect



J. Jackson

Descended from an Irish family, he was born at Clarksburg, W. Va., Jan. 21, 1824.

He secured a nomination to the military academy at West Point, gained an artillery commission, and served in the Mexican War, 1845-48, winning the rank of brevet-major. Religious convictions induced him to leave the army, but in 1851 he went to Lexington military academy as instructor in science, gunnery, and infantry. Not distinguished as a teacher, he became known for his piety and sympathy with the negroes.

On the outbreak of the Civil War, Jackson joined the Confederates and was quickly promoted brigadier. His brigade by its steadiness at the first battle of Bull Run earned him his nickname of Stonewall. Promoted major-general in Oct., he was transferred to command raw troops in the Shenandoah Valley. His stern discipline soon had effect, and although driven out of the Valley, he left it with an increased reputation and a more efficient force. In 1862 by a rapid march he joined Lee in the seven days' battle for the defence of Richmond and helped in McClellan's defeat. From this time he became Lee's most trusted subordinate. He defeated Banks at Cedar Mountain, and in the second battle of Bull Run. In the Maryland campaign, 12,000 Federals surrendered to him at Harper's Ferry.

After this success Jackson's corps was again united with the main force under Lee. It had a share in the battle of Antietam and was equally to the fore at Fredericksburg. The Confederate success at Chancellorsville was due in great part to Jackson's skill. After the battle, while reconnoitring with a small staff, he was shot by mistake by his own outposts. A wound in the left arm made amputation necessary; pneumonia supervened, and Jackson died May 10, 1863. See American Civil War; Chancellorsville.

Jacksonian Epilepsy. A form of epilepsy first discovered by Hughlings Jackson. It is characterised by convulsions localised to a group of muscles or to a function and by the retaining of consciousness until late in the attack. The

condition is due to irritation of a limited area of the motor part of the brain which results in inhibition of the higher centres. See Epilepsy.

Jacksonville. The largest city and an inland Atlantic seaport of Florida, U.S.A.; also the co. seat of Duval co. One of the South's leading ports and rly. and air traffic centres, it stands on the St. Johns River, which flows into the Atlantic. The city is 14 m. from the mouth, and is served by the Southern and other rlys., coastal and foreign steamship lines, and air routes. An excellent inland harbour, with 8 m. of berthing space and warehouses for citrus fruits, naval stores, etc., has been developed by dredging. This is the last port of call on the Atlantic for many vessels going to S. America and the Far East. Jacksonville exports citrus fruits, lumber, and oyster shells, and imports petroleum products, fertiliser materials, creosote, and oil. Here is the world's largest cigar factory; the city produces a tenth of the cigars consumed in the U.S.A. Other plants make fertilisers, chemicals, glass, and tinned foods.

A city blossoming with hibiscus, oleander, and bougainvillea, Jacksonville has a fine system of municipal parks. It is the seat of the Edward Waters college for Negroes and the Florida Historical Society's library, and has the state's largest public library and a municipal stadium. In 1822 it was laid out and named after Andrew Jackson, Florida's first territorial governor; it was incorporated in 1832. During the Civil War it was occupied four times by Union forces, and almost wholly destroyed on their final withdrawal in 1865; also by fire in 1901. The population at the 1950 census was 204,517.

Jacksonville. City of Illinois, U.S.A., the co. seat of Morgan co. It stands on the Mauvaiseterre Creek, 34 m. W. of Springfield, and is served by rlys. In a district producing maize, wheat, oats, and hay, it makes steel bridges, textiles, shoes, and wheels. It is the seat of Illinois college. Settled in 1818, it became a city in 1867. Pop. (1950) 20,387.

Jack Straw's Castle. Name of an ancient inn near the highest part of Hampstead Heath (*q.v.*). Once a resort after the races held on the Heath, it became later a favourite with authors and artists. Dickens and his friends often supped here, and the inn is

mentioned in Thackeray's novel *The Newcomes*. It was renovated in 1898, but the upper part was badly damaged by a German land mine, March 19, 1941. When, in 1381, a party of Wat Tyler's force, to which Jack Straw belonged, destroyed the manor house at Highbury (*q.v.*), the ruins there became known as Jack Straw's Castle.

Jack the Ripper. The popular name given to an uncaptured criminal who murdered and mutilated women in the East End of London, 1887-89. There were eight victims in all, beginning Christmas, 1887, and ending July, 1889, though there is some doubt whether the first and last were Ripper murders. Between Aug. 7 and Nov. 9, 1888, six of the murders took place. Though the police actually found one of the women within a few minutes of her murder, the murderer was never captured. Sir Robert Anderson left it on record that the criminal was probably a sexual maniac, a Polish Jew known to the police. The former belief was borne out by the peculiar way in which most of the women were mutilated.

Jacmel. Seaport of Haiti. It stands on the S. coast, on Jacmel Bay, 30 m. S.S.W. of Port-au-Prince. The roadstead affords good anchorage $\frac{1}{2}$ m. off shore. Principal exports are coffee, logwood, gum, cotton, and cotton seed. The town consists chiefly of wooden houses and narrow streets.

Jacob. Younger son of Isaac and Rebekah (Gen. 25). Having obtained his elder brother Esau's birthright and his father's blessing by stratagem, he became his father's heir and one of the three great patriarchs of the Israelites. He seems to have been the favourite son, and was certainly better fitted than his brother to become the leader of a great tribe. In the vision at Bethel of a ladder set up from earth to heaven, he was assured of divine protection.

Having journeyed to Haran, he served his uncle Laban 14 years as a shepherd and obtained first Leah and then Rachel as his wives; here all his sons were born except Benjamin. During this period he flourished greatly and became wealthy in flocks and herds. Returning to Canaan, he saw a vision of angels at Mahanaim, and wrestled with a mysterious visitor on the bank of the Jabbok, when he received the new name of Israel. At a meeting with his brother Esau immediately afterwards, a complete reconciliation

was effected. Jacob then settled at Shechem.

The sale of his son Joseph to Egypt was a bitter grief, only allayed when a famine caused him to send his other sons to Egypt to buy corn, and the high position of Joseph was discovered. Soon after their return, he removed with his family to Egypt, where he was honourably received by Pharaoh, and settled in Goshen in the delta of the Nile, where the remainder of his life was spent in peace and prosperity. *See* Jews.

Jacob, A. M. (?1850–1921). Oriental adventurer. Perhaps an Armenian or a Pole, but claiming Turkish nationality, he was sold as a slave boy to a pasha. After making the pilgrimage to Mecca, he obtained employment as a scholar at the court of the nizām of Hyderabad. He dealt in jewels at Delhi, then moved to Simla, where he amassed a large fortune. After an unsuccessful deal in diamonds with the nizām, he was accused of fraud, and although acquitted he was ruined. The original of Lurgan Sahib in Kipling's *Kim*, and central figure in F. Marion Crawford's *Mr. Isaacs*, he died in Jan., 1921.

Jacob, NAOMI (b. 1889). British novelist. Born of Jewish stock at Middlesbrough, July 1, 1889, she became an active supporter of the women's suffrage movement, and was on the stage. During the 1920s she made her reputation as a novelist, for long writing two books annually. The best-known include *The Man Who Found Himself*, 1929; *Roots*, 1931; *Four Generations*, 1934; *Fade Out*, 1937; *Susan Crowther*, 1945. She also wrote autobiographical volumes, e.g. *Me*, 1933; *Me and the Mediterranean*, 1945; and a biographical study of Marie Lloyd.

Jacobabad. Town and taluka of West Pakistan, in the north of the former prov. of Sind. Jacobabad town was the chief British military frontier station before the occupation of Quetta in 1877. Its cantonment was retained until 1914. The town was planned and laid out on the site of the village of Khangarh by Gen. John Jacob, commandant of the frontier, 1847–58, who built the residency. A clock made by Jacob still works. Buried in Jacobabad, he is honoured as the "pacifier of Upper Sind." This is a flourishing market town and the headquarters of the district. Very dry (average rainfall about 2 ins. a year), it has usually the highest temperatures in the Indian peninsula, reaching

about 126° F. in May and June. Pop. of town (est.) 25,000.

Jacobi, ABRAHAM (1830–1919). German-American physician. Born in Westphalia, May 6, 1830, he took a medical degree at Bonn, but having suffered imprisonment for his political views, went to America, where he began to practise in New York, 1853. Specialising in children's diseases, from 1860 to 1870 he was professor of that subject in New York, and thence to 1902 in the college of physicians and surgeons, Columbia university. He set up a children's clinic in 1862, wrote largely on his special subject in Latin, English, and German, and was the founder of pediatrics (science treating of the hygiene and diseases of children) in America. He died July 10, 1919.

Jacobi, CARL GUSTAV JACOB (1804–51). A German mathematician. Born of Jewish parents at Potsdam, Dec. 10, 1804, he was the most inspiring mathematical teacher of the first half of the 19th century and perhaps the greatest Jewish mathematician. He was the professor of mathematics at Königsberg, 1827–42. His most celebrated investigations were on elliptic functions, the modern notation of which is substantially owed to him, and the theory of which he established at the same time as the subject was being investigated by the young Norwegian mathematician Abel.

Among his other investigations were those on determinants, commemorated by the use of the term Jacobian as applied to one important form of determinant. He followed Gauss in developing the theory of numbers. His memoirs on differential equations; his development of the calculus of variations; and his contributions to the problem of three bodies, are all of first-class importance. He died at Berlin, Feb. 18, 1851.

Jacobi, FRIEDRICH HEINRICH (1743–1819). German philosopher. Born at Düsseldorf, Jan. 25, 1743,



F. H. Jacobi,
German philosopher

and educated for a commercial life, he was early attracted by philosophy and theology. Jacobi was equally opposed to Hume's scepticism, French materialism, and Kant's formalism—in fact to all speculative philosophy. According to him, all knowledge was

founded on faith or immediate intuition, a sort of instinct whereby the mind immediately grasped the most important religious truths. During 1807–12 he was president of the Academy of Sciences, Munich, where he died March 10, 1819.

Jacobins. Political society in France, prominent during the Revolution. The body originated in the



Jacobins. Badge of
the revolutionary
society

meetings of some members of the *States-General* at Versailles, calling themselves the Breton Club. Later they gathered in a Dominican convent in the Rue St. Honoré, Paris; Jacobin was an old French name for the Dominican order. The Jacobins at first were constitutional monarchists, and styled themselves the Friends of the Constitution, including among their number d'Aiguillon, Mirabeau, de Noailles, Grégoire, Barnave, Chénier, and the Lameth brothers. Numerous affiliated Jacobin clubs sprang up all over the country.

After the king's flight to Varennes, 1791, there was a schism in the club, the Feuillants and Girondins being offshoots, and this was accentuated by the abolition of royalty and the proclamation of a republic. Henceforth the extreme republicans—Robespierre, St. Just, Marat, and Couthon—dominated the body in the capital and in the provinces. During the Terror their small but compact organization gave them unrivalled power, but the fall of Robespierre brought their sway to an end, and the club was closed in Nov., 1794. Attempts at revival were made in 1796 and after the *coup d'état* of 18 Fructidor, 1797, but in 1799 the Jacobins as such had ceased to exist. They wore a badge showing a Phrygian cap of liberty.

In other countries the name Jacobins became synonymous with holders of advanced political ideas. Similar societies were founded in England, notably the London Corresponding Society and the Friends of the People (*q.v.*), to which the newspaper, *The Anti-Jacobin*, 1797, was a counterblast. *See* Feuillants; French Revolution; Girondins; Mirabeau; Robespierre.

Jacobite Church. Name given to the followers of Jacob Baradaeus, a Monophysite monk of

Edessa (d. 578), who reorganized and restored the sect. The name was later applied to the Oriental churches of Egypt, Antioch, and Armenia, which were charged with holding the Monophysite (*q.v.*) heresy. A development of the teaching of Eutyches (*q.v.*), it was supported by Dioscorus, patriarch of Alexandria, who was condemned and deposed by the council of Chalcedon (A.D. 451).

But the majority of the Church of Egypt, now known as the Coptic Church, rejected the decisions of the council, and the result was a succession of Monophysite patriarchs of Alexandria. A rival succession of orthodox patriarchs was maintained until about 640, when the Mahomedans took the Monophysites or Jacobites under their protection. The sect became powerful in Palestine and Asia Minor, and finally became established as the national Church of Egypt. At the present time the Jacobite Church includes the three patriarchates of Alexandria, Antioch, and Armenia; but its bishops repudiate Monophysite doctrines and are as orthodox as those of other Oriental Churches.

Jacobites. Supporters of James II of England and his descendants. After his flight from England in 1688, through the rest of his life and that of his son James Edward (*q.v.*), the Old Pretender, the adherents of the exiled Stuarts were known as Jacobites. In Ireland they were powerless; in Scotland they were relatively much more numerous than in England. It was inevitable that the sympathies of Roman Catholics should be Jacobite; so also were those of English Churchmen who upheld the doctrines of divine right and passive obedience. But the real strength of the Jacobites lay in the emotional sentiment of loyalty to the royal house, and in the absence of any corresponding sentiment in favour of Dutch William or of the Hanoverian Georges.

In England, at least, Jacobites generally realized that after Dundee's death at Killiecrankie, July 27, 1689, and William's victory of the Boyne, July 1, 1690, there was no prospect of a successful Stuart restoration without substantial aid from France. Politicians, seeking to be secure in any event, corresponded with the Stuart court. Several Jacobite plots against King William were detected and suppressed. In 1714 the plans of Bolingbroke for effecting a Stuart restoration were foiled by the sudden death of Queen Anne. After the

accession of George I (1714) the wretchedly organized rising of 1715-16, the "Fifteen," proved a melancholy fiasco. A still more futile attempt collapsed in 1719.

No other organized effort was made till the landing of Charles Edward, "Bonnie Prince Charlie," the Young Chevalier or Pretender, in Moidart in 1745. For a moment it almost seemed that the Jacobite cause might be successful, but it was finally shattered at the battle of Culloden, April 16, 1746. Any remaining hopes were destroyed by the moral collapse which overtook Charles Edward; while the destruction of the clan system in the highlands deprived the Jacobites of the only military base they had possessed. Thenceforth Jacobitism became just a sentiment, romantically cherished, but without any real desire of fulfilment. See Charles Edward; James Edward; Culloden; Fifteen, The; Forty-Five, The; King over the Water, The; Sheriffmuir; Stewart; consult also The Jacobite Relics of Scotland, J. Hogg, 1819-21; The Jacobite Movement, C. Petrie. 1949-50.

Jacobs, HELEN HULL (b. 1908). U.S. lawn tennis player, born at Globe, Arizona, Aug. 6, 1908. She won the women's singles and doubles titles of California in 1926, and played for her country in the Wightman Cup every year from 1927 to 1937 and in 1939. From 1932 to 1935 she was U.S. lady champion, and at Wimbledon was runner-up in the singles on five occasions and winner in 1936. Her favourite stroke was a heavily chopped drive.

Jacobs, WILLIAM WYMARK (1863-1943). British author. The son of a wharf manager, he was



William Wymark Jacobs

Russell



Helen Jacobs,
U.S. lawn tennis
player

stories and a humorous novel, *The Skipper's Wooing*, 1897, and henceforward gave his whole attention to writing. He died Sept. 1, 1943.

His volumes of short stories include *Many Cargoes*, 1896; *Sea Urchins*, 1898; *Light Freights*, 1901; *The Lady of the Barge*, 1902; *Odd Craft*, 1903; *Captains All*, 1905; *Short Cruises*, 1907; *Sailors' Knots*, 1909; *Ship's Company*, 1911; *Night Watches*, 1914; *Deep Waters*, 1919; *Sea Whispers*, 1926. Longer stories, besides *The Skipper's Wooing*, are *A Master of Craft*, 1900; *At Sunwich Port*, 1902; and *Dialstone Lane*, 1904. Jacobs's stories are mainly of seafaring men, whose innocence or ignorance lands them into foolish and improbable adventures. Many are told by his best-known character, the Night Watchman. A certain monotony in plot, treatment, and character may be urged, but they are full of the humour of understatement, and in his peculiar field their author is without a rival. He excels in short stories of the occult, e.g. *The Monkey's Paw*, one of the most powerful of its kind, dramatised by L. N. Parker, 1910. He was also part author of a play, *Beauty and the Barge*.

Jacobsen, JENS PETER (1847-85). A Danish author. Born in Jutland, April 7, 1847, he was from childhood interested in both science and letters. He first studied botany in Copenhagen, and was awarded the gold medal of the Academy for his contributions

to Danish botanical knowledge in 1872. He translated Darwin's *Origin of Species and Descent of Man*. In 1872 he published his first book of stories, *Mogens*. He then began an historical novel, *Marie Grubbe*, 1873-76, but put it aside for some years while he travelled in Germany and Italy. An artist in prose, he died of tuberculosis at Thisted, April 30, 1885. Of his works, *Niels Lyhne*, 1880, has been translated, as *Siren Voices*, into English; so have *Marie Grubbe*, and Jacobsen's poems. His collected works were published 1888 and 1918.

Jacob's Ladder, GREEK VALERIAN, OR CHARITY (*Polemonium coeruleum*). A perennial herb of the family Polemoniaceae. A native of Europe, N. Asia, and N.



J. P. Jacobsen,
Danish author

America, it has a short, creeping rootstock and tall leafy stems. The long leaves are broken up, feather-wise, into from six to twelve pairs of smooth, lance-shaped leaflets. The stem and branches end in a large cluster of fine blue or white drooping flowers.

Jacobus (Lat. form of James). Name of a gold coin struck by James I of England. Its value was 25s. See Coinage.

Jacoby, HENRY (d. 1922). A British murderer. On March 14, 1922, Lady White, a sixty-year-old widow, was found unconscious in bed at an hotel in Marylebone suffering from terrible head wounds; she died the following morning without regaining consciousness. On March 21 Jacoby,



Jacob's Ladder. Stalks with flowers and foliage

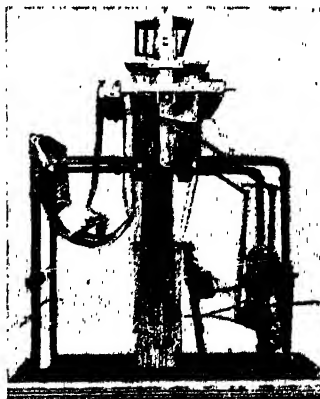
Its value

invented his loom, which was exhibited in Paris in 1801. Improvements and modifications of the original loom revolutionised the weaving industry, and in 1806 the invention was acquired for the nation, Jacquard being granted a royalty and a pension. He died Aug. 7, 1834. See Lace.

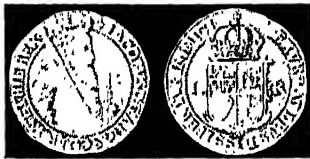


J. M. Jacquard, French inventor
After Bonnafont

Jacquard Loom. A pattern-weaving loom invented by Joseph M. Jacquard (v.s.). It enabled individual warp threads or groups of threads to be lifted in a pre-arranged order automatically, in conformity with the set design. Before Jacquard's invention only simple designs could be woven, by connecting groups of warp threads to one or more heddles, the latter operated by depressing corresponding pedals. More complex designs needed three persons to operate the loom: one who "read" the master design and called out to a second which threads to lift; and directed the third (the weaver) what colours he must next employ in shooting his shuttles.



Jacquard Loom. Early model of the loom invented by J. M. Jacquard



Jacobus. Obverse and reverse of the gold coin struck by James I

an 18-year-old pantry boy, was charged with the crime. Jacoby admitted to detectives that he had decided to rob the guests' bedrooms, and made his way to the basement where workmen had left their tools. He took a hammer; entered Lady White's room; and struck her with the tool when the light of his torch awoke her. Terrified, the boy washed the hammer and returned it; but its unnaturally clean condition had attracted the attention of the police and caused them to cross-question the hotel staff. Tried at the Central Criminal Court on April 28, Jacoby was found guilty. His youthful appearance aroused public sympathy, and seldom has a death sentence evoked such criticism. Two petitions recommending him to mercy were presented to the home secretary, but Jacoby was hanged at Pentonville on June 7.

Jacopone da Todi (c. 1240-1306). An Italian poet. Of noble family, he became a Franciscan. His ecstatic devotion inspired many remarkable examples of impassioned mysticism, and his religious dialogues or *laudes* displayed considerable satiric power. He was imprisoned for opposition to Pope Boniface VIII, 1298-1303, and

died Dec. 25, 1306. It is conjectured that he was the author of the famous *Stabat Mater*.

Jacquard, JOSEPH MARIE (1752-1834). A French inventor. Born at Lyons, July 7, 1752, he was trained to his father's trade of weaver, but failed in business. After the Revolution he entered a factory in his native city, where he

Vaucanson had invented a mechanism which allowed simple or small designs to be woven automatically. Vaucanson used a horizontal cylinder perforated with holes in regular lines as the controlling energy; to every warp thread was attached one end of a vertical lifting thread, and the opposite ends of the latter were led to a framework in which were needles pressed by springs against the face of the cylinder. Around the cylinder was wrapped a card perforated with holes to coincide with the master design, in such a way that a hole would allow the corresponding needle to pass and enter a hole in the cylinder beneath: this caused the lifting thread in question to lift its warp thread; all other lifters were unaffected unless operated by perforations in a similar manner. The drawback to Vaucanson's arrangement was that the entire design had to be contained on the card wrapped about the cylinder, the diameter of which was limited by mechanical considerations.

Jacquard, while retaining Vaucanson's cylinder and a modification of the same inventor's thread-lifting device, introduced a series of rectangular cards, each linked by a hinge to the next, as the operating mechanism in place of the card which Vaucanson had wrapped around the cylinder. Thus a comparatively small design could be worked by connecting the required cards into an endless band which passed regularly through the overhead "box"; or a much longer series of cards might be used, folded over and stacked as they descended automatically from the box above. When the weaver depressed a pedal, the "griffe" overhead engaged with and lifted the hooks attached to the lifting threads, provided that plungers linked with these threads passed through perforations in the cards; otherwise, the hooks were out of engagement, and the griffe slipped past them without raising them. Jacquard's loom revolutionised figure weaving and in its developments is important today. He was a pioneer in utilising punched cards to control mechanical movements. See Loom; Weaving.

Jacquemart, JULES FERDINAND (1837-80). French engraver and painter. Born in Paris, Sept. 3, 1837, he studied art under his father, Albert Jacquemart (1808-75), his son's first considerable work being a series of etchings for the *Gazette des Beaux-Arts*, 1859. In

1862 he supplied the plates for his father's *Histoire de la Porcelaine*, and in 1864 produced 60 plates for Barbet de Jouy's *Les Gemmes et Joyaux de la Couronne*. One may cite also 12 plates for his father's *Histoire de la Céramique* and for the *Histoire du Mobilier*, and about 400 reproductive etchings. One of the founders of the *Société des Aquarellistes*, he died Sept. 26 1880.



J. E. Jacquemart,
French engraver

Jacquemart-André Museum. Museum of fine arts in the Boulevard Haussmann, Paris. It contains pictures, sculptures, and *objets d'art*, bequeathed to the Institute of France by Nélie Jacquemart (1840-1912), a painter who married the banker and collector, Edouard André. Opened Dec. 8, 1913, the collection contains works by Fragonard, Nattier, Lancret, and others of the French school; Reynolds, Gainsborough, and Hoppner of the English; Rembrandt, Hals, and Ruysdael of the Dutch; Memling and Rubens of the Flemish; and many Italian masters, notably the S. George and the Dragon of Paolo Uccello, a head of Christ by Mantegna, and a Virgin and Child by Baldovineti. There are also several fine tapestries, illuminated MSS., and Louis XV and XVI furniture.

Jacquerie. Name given to a rising in France. In May, 1358, while the country was being ravaged by the English invaders, the peasants around Beauvais, in Normandy, rose in rebellion. The movement spread, the nobles retaliated, and as one chronicler says, "cultivation ceased, commerce ceased, serenity was at an end." The citizens of Paris sent a force to help the peasants, but the nobles also found assistance, and their armed disciplined forces soon got the upper hand. In six weeks the rising was quenched in blood: 20,000 peasants are said to have been slain between the Seine and the Marne. The leader of the rebels, William Collet from Clermont, was tortured and hanged. The name *Jacquerie* means the rising of Jacques, Jacques Bonhomme being a popular name for the French peasant. See France; History.

Jactitation (Lat. *jactitare*, to boast). Ecclesiastical law term. It means making a false pretension or boast of a marriage. If a person

falsely pretends to be married to another, the latter may bring a suit for jactitation of marriage; and on the case being proved, the respondent is ordered to be silent for the future. See Divorce; Husband and Wife.

Jade. Several compact greenish minerals capable of taking polish have been confused under the term jade, which should be restricted to two minerals, nephrite and jadeite. These are extraordinarily alike in appearance, but differ in specific gravity determination: nephrite, 3.0-3.1; jadeite, 3.3. The name jade comes from Span. *ijada*, flank or side, because the stone was considered a cure for the colic if worn on the side. Similarly, nephrite is from Gr. *nephros*, kidney. Jade is highly prized as an ornamental stone, which has been worked by craftsmen since ancient times, especially in Egypt, China, and other Eastern countries. See Jadeite; Nephrite.

Jade OR JAHDE. River and bay of Oldenburg, *Land* of Lower Saxony, Germany. The river falls into the bay after a course of only 13 m. The bay is an opening of the North Sea, near the mouth of the Weser. Formed by the sea breaking on the land, it covers 75 sq. m., and affords safe anchorage. Wilhelmshaven (*q.v.*) stands at its entrance. Pron. Yah-de.

Jadeite. One of the monoclinic pyroxene group of rock-forming minerals. Colour is variable, generally with green tints. This is essentially a metasilicate of sodium and aluminium; the origin is controversial, but it may be caused by the deep-seated metamorphism of rocks like nepheline-syenites or phonolites. Compact, finely granular, jadeite is the more valuable of the two minerals included under the term jade (see Nephrite). The jadeite carved in China was imported from Upper Burma.

Jaeger (Ger. hunter). Type of German infantry unit, or soldier in such unit. Corresponding roughly to the British rifle regiments and the French *chasseurs (q.v.)*, jaeger regiments were organized as normal infantry except that their transport was entirely on a pack basis, and the battalion sometimes included a company of guns. They were specially trained in skiing and mountain warfare. Some regiments were described as Gebirgsjaeger, mountain troops. In the Second Great War Panzerjaeger were anti-tank units. There was a Panzerjaeger regiment to every division; each infantry battalion contained a Panzerjaeger company.

Jaeger, HANS (1854-1910). A Norwegian author. Born Sept. 2, 1854, at Drammen, he became a sailor, then a clerk in the Norwegian parliament. He created a sensation by publishing in 1885 the daring naturalistic novel *Christiania Bohème*, a plea for unmarried love; confiscated, this book provoked widespread intellectual conflict. The author fled and, mostly from Paris, published other novels: *Sick Love*, 3 vols., 1893; *Prison and Despair*, 1902. In 1907 he exposed further ideas in an *Anarchist Bible*. His books were later translated and appeared far less radical than to the contemporaries of Jaeger, who died at Christiania (Oslo), Feb. 8, 1910.

Jael. Wife of Heber the Kenite (Judges 4 and 5). After the defeat of Jabin's army by the Israelites under Barak and Deborah, Jabin's general Sisera fled to Jael's tent for refuge. Jael, choosing between violation of the laws of hospitality and betrayal of Israel, killed the fugitive in a manner described differently in the prose of chap. 4 and in Deborah's song (the earlier version) in chap. 5.

Jaén. Inland prov. of S. Spain, in Andalusia. It is bounded N. by the Sierra Morena, E. by Murcia, W. by Córdoba, and S. by Granada. Its area is 5,209 sq. m. Mostly mountainous, it lies within the basin of the upper Guadalquivir, and its valleys are fertile, producing cereals, oil, and wine, though the bleak uplands pasture only sheep. Its mineral wealth, known to the Romans, is great; there are 400 lead mines, including the historic silver lead mine at Linares; iron, copper, and salt are also worked. In the W. communications are good, but the E. half has no rly. Jaén was a petty Moorish kingdom until 1246, after which it came under the sway of Castile. Pop. (1950) 765,697.

Jaén. City of Spain, the capital of Jaén prov. On the N. slope of the Jabalcuz Mt., at an alt. of 1,500 ft., overlooking the Jaén river, it is on the Linares-Puente Genil rly. There are remains of a Moorish castle and walls, and a Renaissance cathedral, containing a miraculous handkerchief of S. Veronica; and a number of other churches, of which S. Andrew's (16th century) has a handsome altar screen in wrought iron repoussé work; S. Bartholomew's, close to the ramparts, was the parish church from the 15th century or even earlier; and S. John's is a modern church incorporating in its façade an ancient pointed

arch. Manufactures include textiles, leather, soap, and alcohol. The sulphur baths and springs of Jabalcuz are well known. As the Moorish Jayyan, this was a wealthy city, celebrated for its silk, and the capital of a small kingdom, until its conquest in 1246 by Ferdinand III of Castile. Pop. (1950) 61,619.

Jaén. Small town of Peru, in Lambeyeque department. It is on the r. Chinchipe, a tributary of the Marañon, 120 m. N.N.E. of Chiclayo. An old settlement, it was abandoned on account of its unhealthiness, but was brought back to life when it became the centre of a rice-growing district. A road linking it with Chiclayo and the Pan-American Highway was completed in 1944. Pop. (est.) 3,500.

Jafarabad. Town of Bombay state, India, in the Kathiawar pen. It stands on the Gulf of Cambay, 38 m. E.N.E. of Diu Head, about 1 m. from the sea. It was the capital of a petty state (area 53 sq. m.) of the same name, merged in 1948 in Saurashtra, itself merged in Bombay 1956.

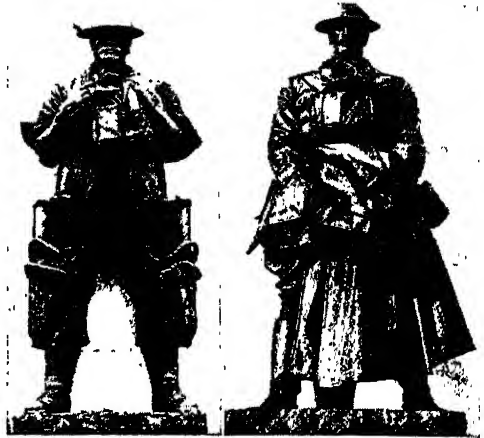
Jaffa. Ancient town and port of Palestine, in Israel from 1948 and in 1949 united into an administrative unit with Tel Aviv (see Tel Aviv-Jaffa). The name of Jaffa appears in history as early as the 15th century B.C. The place is mentioned as Joppa (*q.v.*) in Egyptian records and in the Bible. During the 12th century A.D. it was twice taken and lost by the Crusaders. Napoleon captured it in 1799. In the First Great War Jaffa was captured from the Turks by Allenby's forces without opposition, Nov. 17, 1917, to secure the British left flank in the coming operation against Jerusalem, 50 m. to the S.E. It was in British mandated Palestine during 1922-48, and lay within the area proclaimed

in 1948 as the republic of Israel. Its Arab population (more than 60,000 out of 94,000) fled. Many of its old buildings were later demolished to make way for an enlarged port, its old harbour having been suitable only for small craft.

Jaffna. Town of Ceylon. It lies in the flat portion of N. Ceylon called the Jaffna peninsula, which is broken up by two shallow lagoons of brackish water that are connected at a few points with the sea; one of these makes the peninsula in reality an island. During the monsoons new sandbanks are constantly made in the shallow channels. The town is the centre of an area peopled by Tamils, and was formerly the port for Tamil immigrants from the Madras province of British India. It has a shallow harbour and is connected by rly. with Colombo. Pop. (1953) 76,664.

Jagannath. Another form of the name Juggernaut (*q.v.*).

Jagellon. Name of the family that ruled Poland from 1386 to 1572. In 1386 the hand of the heiress to the Polish throne, then a child, was given to Jagiello, grand duke of Lithuania. He took the name of Wladislaw when he was crowned king of Poland in 1386, but his descendants were known by his original name corrupted into Jagellon. The last of the Jagellon kings was Sigismund, who died in



C. S. Jagger. Two of the great bronze figures on the Royal Artillery memorial, Hyde Park Corner, one of this sculptor's finest works. See entry below

1572. The period of their rule was Poland's "golden age"; under their influence voluntary union was effected with Lithuania, Livonia, Ruthenia, and Moldavia, making Poland at the end of the 16th century the largest state on the Continent.

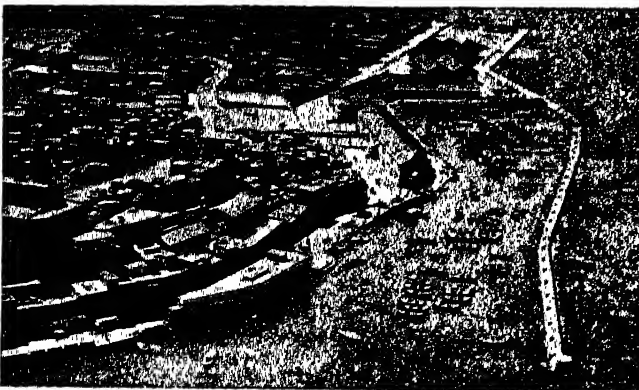
Jagersfontein (Dutch, hunter's spring). Town of the Orange Free State, S. Africa, 9 m. E. of Fauresmith. The diamond mine discovered here in 1878, the most important in the O.F.S., produces fine quality stones. Pop. (est.) 3,000.

Jagger, CHARLES SARGEANT (1885-1934). British sculptor. Son of a Yorkshire colliery manager, he studied art at Sheffield and the Royal College of Art. A fine technician, he executed the British war memorial to Belgium in Brussels and the Royal Artillery memorial at Hyde Park Corner. For his fine group in stone at Imperial Chemical House, Westminster, Jagger was awarded a medal by the R.S.B.S. in 1933. He also made a statue of George V for New Delhi. Jagger, who took the Rome prize in sculpture in 1924, died in London, Nov. 16, 1934.

Jaggery. Sugar made of sap drawn from the upper stems of various palms, chiefly *Phoenix silvestris*. It is a common name for sugar in the East. As much as 15 p.c. of sugar is contained in the juices of some palms, and if it is fermented and distilled a form of arrack results.



C. S. Jagger, British sculptor



Jaffa. Air view of the reconstructed harbour of Jaffa, an ancient town of Palestine, which in 1949 was joined with Tel Aviv to form a single city of Israel

Jaguar (*Felis onca*). The largest species of the American spotted cats, inhabiting the forests of Central and S. America, and the pampas of Argentina. A savage beast, it is heavily built, the head and body measuring 4 ft., independently of the tail; the head is ponderous, and the short limbs and feet are massive and powerful.

Though the scheme of coloration may be said to be similar to that of the leopard, the black spots are larger and squarer, and arranged in more definite rows, instead of rosettes. As the beast is arboreal in its habits, resting during the day upon limbs of trees, this type of colouring reproduces the shadows thrown by leaves, and enables the jaguar to approach its prey unseen. It is very destructive to monkeys, mounting up to the topmost branches in their pursuit; or it will drop from a limb upon a peccary passing beneath.

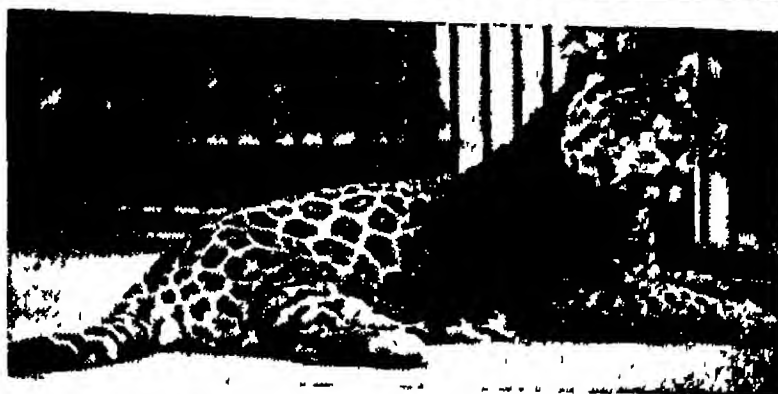
The jaguar is frequent in the forests that border the great rivers, where it kills alligators and turtles, not hesitating to pursue them into midstream. The eggs of the turtle are dug up and consumed by it. It ventures far out on the pampas, where it destroys cattle, horses, and sheep.

Jaguarondi (*Felis jaguarondi*). A species of wild cat, found in Central and S. America. It varies in colour from almost black to a reddish grey, and is without markings. Its average length is 4½ ft., nearly half of which is tail. The eye, unlike that of many cats, has a round pupil. The creature preys on birds and small mammals.

Jahn, Otto (1813-69). German archaeologist and philologist. Born at Kiel, June 16, 1813, he travelled in France and Italy; and held chairs in archaeology at Greifswald, Leipzig, and from 1867 at Berlin. He wrote on the paintings of Polygnotus, 1841; on Hellenic art, 1846; and on Greek vase-paintings, and edited several Greek and Latin classics. His biography of Mozart, 1856-60 (Eng. trans. 1891), is an important contribution to musical history. He died at Göttingen, Sept. 9, 1869.

Jahu. Town and district in the state of São Paulo, Brazil. The town is about 150 m. N.W. of the capital and is served by rly. Breweries and distilleries give employment, and the district is agricultural, supporting a pop. of about 80,000.

Jahvist or **YAHWIST**. In Biblical criticism, the name given to the author of the passages in the Hexateuch, in which the word



Jaguar, S. American member of the cat tribe
Gambier Bolton, F.Z.S.

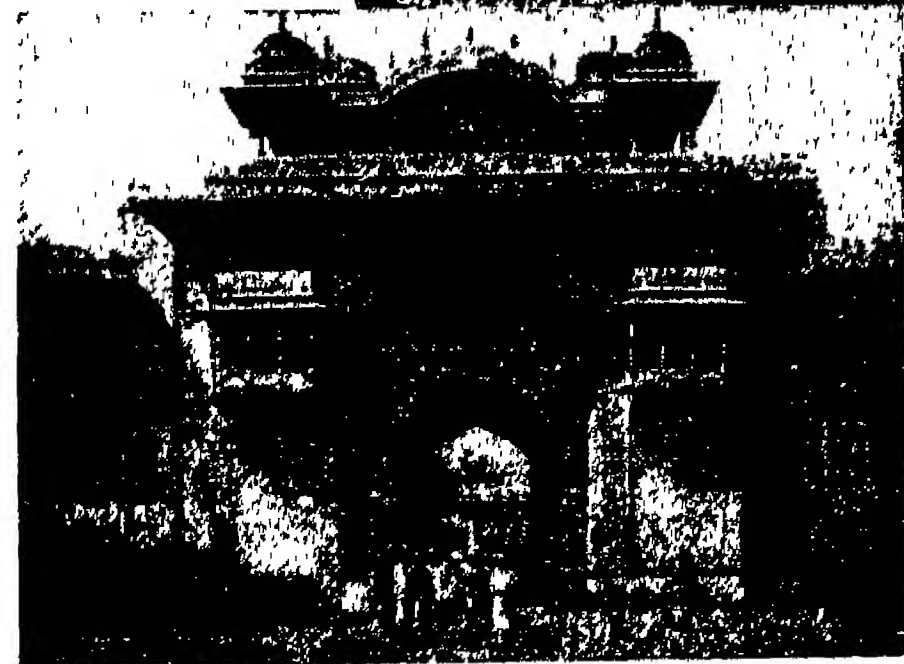
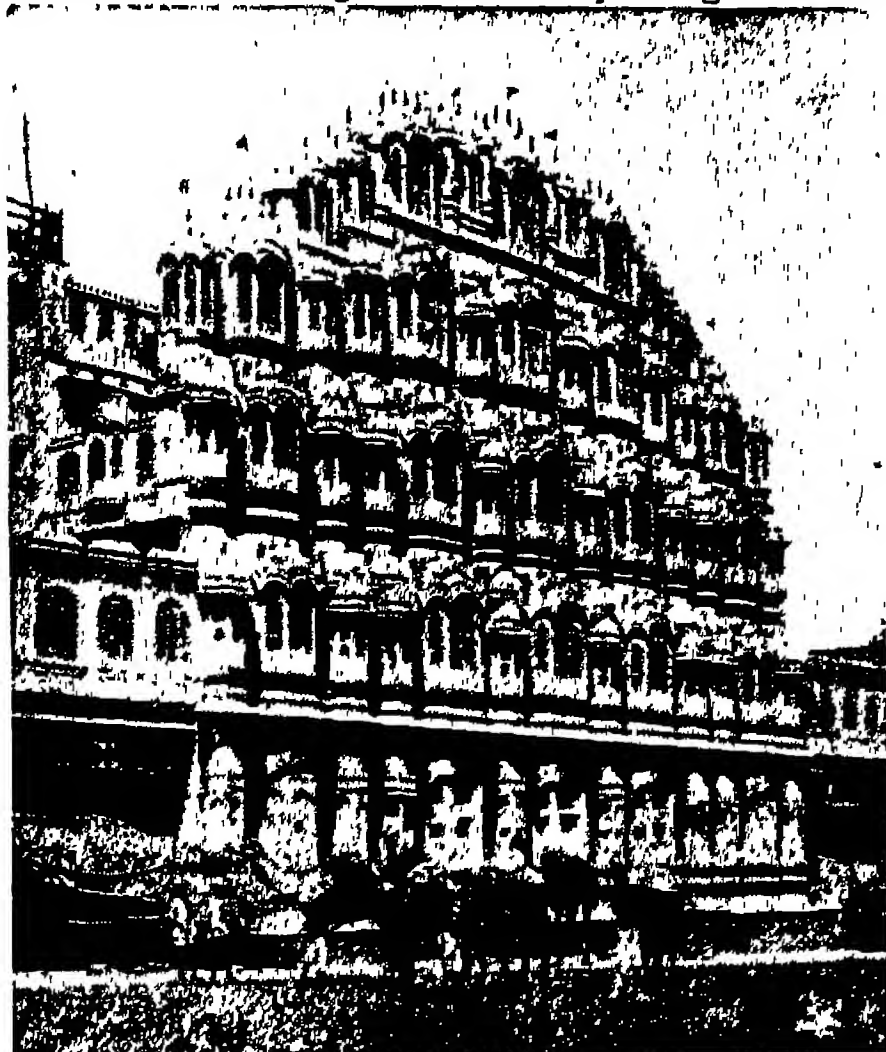
Yahweh or Jehovah is constantly used as the name of the Almighty. See Bible; Criticism: Biblical; Hexateuch; Jehovah.

Jainism. A form of Hindu religion long practised in N.W. districts of the Indian subcontinent. Jainism is said to date from the 6th century B.C. and it was apparently a development of Brahmanism akin to Buddhism. It rejected the divine authority of the Brahman sacred writings, and evolved a kind of pantheon of saints, known as Jina or Jains. Its followers believe in a future existence for all forms of life, and take extraordinary precautions to avoid accidentally killing even the smallest creature. Peaceful, gentle, and liberal, they practise abstinence and other forms of penance, many of them going without clothing, and even starving themselves to death. They reject the caste system of the Brahmans, but most of them belong to the wealthier classes. Their numerous temples are noted

for superb architecture; but the sect now numbers only about a million. See Calcutta illus.; Hinduism; India.

Jaintia Hills. A mountainous district of Assam, which lies E. of the Khasi Hills and S. of the Brahmaputra, and is inhabited by a race called Panars, who speak a monosyllabic language. The district produces rice in abundance; coal and limestone are the chief minerals. The town of Jaintiapur lies at the S. base of the hills.

Jaipur. Division and district of Rajasthan, India. The middle of the div. is a tableland; to N. and W. lies the continuation of the Aravali Hills in a series of low heights. The Banas is the chief river. The principal crops are millet and barley. Cotton and woollen goods are manufactured. Salt and cotton are exported; the imports include piece goods and



Jaipur, India. One of the seven city gates. Upper picture, the Hawa Mahal or Hall of the Winds

rice. Pop. (1951) div., 5,858,011; dist., 1,656,097.

The former princely state of Jaipur, area 15,610 sq. m., acceded to the dominion of India when it achieved independence, and joined Rajasthan, in 1949.

Jaipur. Capital of Rajasthan, India. Minor industries are

carried on. Jaipur, which was the capital of the former princely state of the same name, has several important buildings, notably the maharaja's palace. Nearly all the public buildings are of pink stone, this being the colour of Siva, with touches of yellow, for Kali. The city is architecturally unique in its combination of Hindu styles and local marble.

Jaipur is a rly. junction, with lines to Delhi, Jodhpur, Baroda, and Bombay. One of the chief places in Rajputana, Jaipur was founded in 1728. Here in 1949 the union of Greater Rajasthan was inaugurated, with the maharaja of Rajasthan as rajpramukh, 1949-56. Pop. (1951) 291,130.

Jaisalmir OR **JESSULMIR**. District of Rajasthan, India, formerly a princely state which in 1949 joined the Rajasthan union. In the W. of Rajputana, it has mostly barren soil, and the few patches of cultivable land support a sparse pop. Jaisalmir, the former capital, about 140 m. W. by N. of Jodhpur, is noted for its Jain temples. The ruler, a maharawal, was entitled to a salute of 15 guns. Pop. (1951) dist., 102,743; town (est.) 10,000.

Jakarta. Indonesian name of Batavia (*q.v.*), capital of the republic of Indonesia as of the Netherlands E. Indies.

Jakobshavn. A Danish settlement on the W. coast of Greenland. It stands on the shore of Disco Bay amid bleak and barren surroundings. In the vicinity is the immense Jakobshavn glacier, which discharges into the bay.

Jakovica OR **JAKOVA**. Alternative forms of Dakovica (*q.v.*), name of a town of Yugoslavia.

Jakun. Primitive people in the S. of the Malay peninsula. Various local groups of them are known as Orang Bukit (hill-men), Orang haut (sea-men), Blandas, Besisi, Mantra, and Udai. Round-headed, straight-haired, coppery, they show Malay, Semang, or Sakai admixture; their culture and social organization approximate to the unadvanced Malay type. Their weapons are the blowgun and the spear, and they occupy pile-dwellings and grow some rice; coastal groups use dug-outs.

Jalalabad OR **JELLALABAD**. A town of Afghanistan. It stands on the Kabul river, 80 m. E. of the city of Kabul, in the midst of a fertile plain, near the Khyber Pass into Pakistan. It was founded by Akbar in 1560. Here in 1841-42 the British, under Sir Robert Sale, kept the Afghans at bay for five months. Pop. (est.) 15,000.

Jalalpur. Town in Gujarat district, West Pakistan. It is a local commercial centre; pop. (est.) 17,000.

The name is also that of a ruined city in West Pakistan, now a small village.

Jalap (*Ipomoea purga*). Tuberous evergreen climbing herb of the family Convolvulaceae, native of



Jalap. Foliage and flower

Mexico. The roundish tuber, sometimes as large as an orange, contains a resinous principle with highly purgative properties. The smooth, alternate leaves are long, heart-shaped, and the salver-shaped

flowers are a purplish rose colour. Several other species of *Ipomoea* yield jalap resin, though of an inferior quality. It is used in dropsy. The name comes from Jalapa.

Jalapa. Department of Guatemala. It is bounded N. by the Rio Grande and watered by its tributaries. The extensive forests yield valuable timber, and the products include sugar-cane, rice, coffee, maize, and tobacco. Area, 1,150 sq. m. Pop. est. 75,000. The capital, Jalapa, the centre of a local trade, is situated 30 m. E. of the ruined city of Guatemala, with which it is connected by rly.

Jalapa OR **HALAPA**. City of Mexico, capital of the state of Vera Cruz. It stands on a slope of the Cofre de Perote, at an alt. of 4,500 ft., 59 m. by rly. N.W. of Vera Cruz, and is a favourite summer resort. Its elegant cathedral contains paintings by Spanish masters; other buildings include a 16th-century convent, schools, and hospitals. The city gives its name to the drug jalap, which is common in the district. There are cotton and cigar factories. Pop. (est.) 40,000.

Jalaun. District and town in Jhansi division, Uttar union, India. About half the dist., area 1,549 sq. m., is under cultivation of gram, millet, and wheat. Among the exports are gram and oilseeds. Jalaun town has some small industries. Pop. (1951) district, 555,239; town (est.) 15,000.

Jalisco. Maritime state of S.W. Mexico. It borders on the Pacific Ocean, and is watered by the Rio Grande de Santiago. Area, 31,149 sq. m. In the W. it rises by terraced plateaux to the Sierra Madre with volcanic cones. To the E. and

along the river valleys the soil is fertile, producing tobacco, cotton, indigo, sugar, palm-oil, etc. Precious stones are found, and gold, silver, copper, and cinnabar are mined. Stock raising is an important industry of this state, one of the wealthiest of Mexico. Its capital is Guadalajara (*q.v.*). Pop. (1950) 1,746,777, the majority Indians or half-breeds.

Jalna. Subdivision and town of Aurangabad dist., Bombay state (formerly in Hyderabad). The subdivision has an area of 744 sq. m. Pop. (1951) town, 58,478; subdiv. (est.) 200,000.

Jalomitza OR **YALOMITZA**. A river of Rumania. Rising in the Transylvanian Alps, it flows S. through the oil district, and then E. through the Wallachian plain, joining the Danube opposite Harsova. Its length is 150 m. During the First Great War the crossings of the lower part of the river were fiercely contested, Mackensen's army forcing it at Urziceni, Dec. 12, 1916.

Jalón. River of Spain, in the prov. of Saragossa. Rising in the Sierra de la Virgen and the Sierra de Vicor, its headstreams unite near Riola, and flow N.E. to join the Ebro, 13 m. above Saragossa, after a course of about 120 m. Alagon, near its junction with the Ebro, is the principal town on its banks. Its valley is followed by the rly. from Saragossa to Madrid.

Jalpaiguri OR **JULPIGURI**. Town of West Bengal, India, capital of the dist. of the same name. It is situated about 52 m. S.E. of Darjeeling, on the Tista river, and on the rly. to Calcutta, and carries on a trade in tea, tobacco, timber, and jute. Rice and tea are the chief crops of the dist. The area of dist. is 3,050 sq. m. Pop. (1951) dist., 914,538; town, 41,259.

Jaluit. Island of the Pacific Ocean. The chief island and the administrative centre of the Marshall Is. (*q.v.*) it lies in lat. 3° N. and long. 170° E. There are plantations of coconut palms, and copra is exported.

Jam. Indian title. Of Tartar origin, the word is a variant of cham, which is connected with khan. It means a chief and was borne by the rulers of Las Bela, a Baluchistan state, and of Nawanganar.

Jam. Food consisting of fruit boiled with sugar to the consistency of a paste. It owes its keeping qualities chiefly to the high proportion of sugar, including natural fruit sugars, which it contains. In making jam at home, about 1 lb. of fruit is used to each lb. of sugar,

these amounts producing about 1½ lb. of jam. During the boiling, the fruit breaks up, the sugar dissolves in the juices (a little water is sometimes added to assist this process), and evaporation takes place until the correct concentration is reached. At the same time, the acid in the fruit acts on the cane sugar used, and partly converts it into a mixture of sugars known as invert sugar. This is a necessary part of the process, since jams containing too much unchanged cane sugar will quickly go "sugary." Another effect of the boiling process is to produce

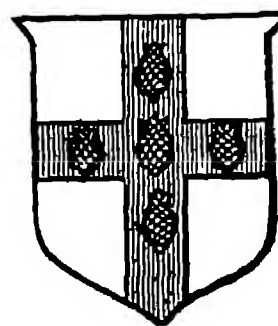
with steam-jacketed pans. The fruit is weighed out into batches of suitable size, and boiled down either with dry white sugar or with sugar which has been dissolved in water to a clear syrup. The pans shown in the illus. are a quick-boiling type designed for use with this syrup. The batches of jam are 80 to 150 lb., and they are boiled from 2 to 12 minutes according to the kind of jam being made and the type of pan used. During this time the water evaporates until a concentration of about 70 p.c. soluble solids is reached. The completion of boiling

jam, the preservative being boiled off in the process. Jam made from pulped fruit is quite wholesome if made from sound materials.

The composition of commercial jams has been controlled by the ministry of Food since Sept., 1940, when an order, subsequently amended but remaining substantially unchanged, came into force based on the standards which had for some time been adopted by the food manufacturers' federation. The minimum permissible soluble solids content is 68½ p.c. No fruit other than that specified may be added, though the addition of small quantities of pectin or fruit juice to assist in setting is permitted. The minimum fruit content is also specified in detail for the various kinds of jam. Jams labelled "fresh fruit standard" must be made entirely from fresh fruit, must be free from artificial colour or preservative, and must have a specified fruit content, varying from 20 p.c. for blackcurrant to 40 p.c. for apricot and plum. "Full fruit standard" jams have the same fruit content, but may be made from pulped fruit.

Marmalade is a jam made from the pulp and shredded peel of oranges, the pips and tough internal skins being removed. Bitter Seville oranges are usually used for the best marmalades, but lemon or grapefruit may be added. Fruit jellies, such as bramble, redcurrant, or blackcurrant, are made by boiling the clear filtered juice of the fruit with sugar until it reaches setting concentration.

Jamaica. Island of the West Indies. One of the Greater Antilles, it is the largest and most important island belonging to Great Britain in the Caribbean Sea. Occupying a central position in the Antillean region, it is about equidistant from the S. extremity of Florida and the N. coast of S. America, and 90 m. S. of Cuba. Its maximum length is 144 m., breadth about 50 m., and area 4,404 sq. m.



Jamaica arms

The dependent islands are Grand Cayman, Little Cayman, and Cayman Brac; and the Turks or Caicos islands, which, although geographically included with the Bahamas, are under the govt. of Jamaica. About 30 small cays, eight inhabited, are attached to the group. The largest is Caicos Island, 20 m. in length and 6 m.



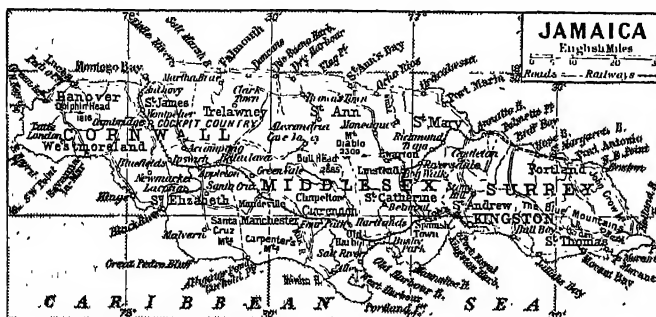
Jam. Rapid-boiling pans used in the commercial production of jam
Courtesy of Crosse & Blackwell, Ltd.

pectin from the fruit tissues. This is a substance which, in the presence of fruit acids and of the necessary amount of sugar, makes the jam set. When fruits are deficient in pectin (e.g. strawberries or raspberries) it is quite justifiable to add a small quantity of pectin derived from another fruit, either in the form of fruit juice or of commercial pectin.

Commercial jams in Great Britain are usually sold in open packs, i.e. in jars with only light paper or parchment covers. They must, therefore, have a sufficiently firm set to stand up to rough handling in transport, and a sufficiently high sugar concentration to resist mould growth even under unfavourable conditions of storage. For these reasons, careful control of the manufacturing process is necessary. The best jams are made during the actual fruit seasons. The freshly picked fruit is brought into the factory as quickly as possible, where it is sorted and the stalks and leaves removed. It then goes at once to the boiling rooms, which are fitted

with steam-jacketed pans. The fruit is weighed out into batches of suitable size, and boiled down either with dry white sugar or with sugar which has been dissolved in water to a clear syrup. The pans shown in the illus. are a quick-boiling type designed for use with this syrup. The batches of jam are 80 to 150 lb., and they are boiled from 2 to 12 minutes according to the kind of jam being made and the type of pan used. During this time the water evaporates until a concentration of about 70 p.c. soluble solids is reached. The completion of boiling

is indicated by dial thermometers placed in the boiling pans (see illus.). Samples are also drawn at intervals during the day and examined in the factory laboratory, as a final check on the concentration of the jam, and to ascertain that the correct amount of invert sugar has been formed to ensure that no "sugariness" will develop on keeping. The jam is then run off and put into pots either by hand or machine. Owing to the very short boiling time, the fruit does not darken to the same extent as in a home-made jam, and a more brightly coloured product is obtained.



Jamaica. Map of the largest of the British West Indian Islands

in breadth. The Morant and Pedro Cays are also attached to Jamaica. The total area, with dependencies, is 4,628 sq. m.

Jamaica owes its value for the British Commonwealth to its position in the Mediterranean area of the New World. The plantations early gave rise to a triangular traffic with the U.K. and Canada whereby manufactures went to Canada, timber and fish to Jamaica, and sugar and tobacco to England. This trade fell into decline during the 19th century and the islands were to some degree relegated to a backwater in relation to imperial trade routes. In the 20th century the position again changed.

Topographical Features

The coastline is broken by numerous inlets, forming safe harbours, the most important being Port Royal, the harbour of the capital, on the S. coast. The interior is an elevated plateau of Antillean limestone, with scattered hills, depressions or sinks, and valleys weathered into their present formation by the action of torrential rains and running streams. On the coast are shelving plains with ancient beach lines, which indicate the gradual uplift of the island. The loftiest points occur in the E., where the Blue Mts. rise to a maximum height of 7,420 ft., many peaks exceeding 5,000 ft.

The lower slopes of the mountains in the N. are covered with luxuriant vegetation, embracing pimento groves and brilliant flowering shrubs—begonias, orchids, cacti, and ferns; and the higher levels by dense forests of ebony, cedar, mahogany, fustic, logwood, lancewood, etc., the timber being an export. Other trees are ceiba, mango, and acacia. The mountains are chiefly limestone, conglomerates, and shales.

The largest inlets are Montego, St. Ann's, Annatto, and Hope

Bays on the N.; Long Bay on the W.; Holland Bay on the E.; and Black River, Old Harbour, Kingston Harbour, and Morant Bay on the S. The principal capes are N. and S. Negril Points on the W., Morant Point on the E., and Portland Point on the S. The numerous rivers are small, the longest being the Cobre, Minho, and Black, which discharge on the S. coast; others flow to the N. coast, the central mountain system forming the watershed. None is navigable, but they serve for irrigation.

Agriculture is the staple industry. Over 1,000,000 acres are under cultivation, largely let out in small holdings. Stock raising is carried on to a considerable extent. The cultivation of tobacco, coffee, and cacao has made great progress, and all tropical products flourish. Up to the Second Great War the production of sugar cane was declining to make way for banana and orange growing. This tendency was reversed in the war years. The principal exports in 1955 were sugar, £10,830,000, and bananas, £5,020,000; export of alumina, £5,083,000, and bauxite, £3,885,000, was also important.

There is diversity but little or no extreme of climate, which is generally warm and agreeable, with average annual rainfall 44 ins. Earthquakes and hurricanes are fairly frequent. There are no indigenous mammals and only a few reptiles, including a large iguana and several species of snakes. The scorpion and centipede are poisonous. Bird life is plentiful; the commonest birds being parrots, buzzards, humming birds, tyrant birds, and the green tody. Insects abound, particularly mosquitoes and sand flies.

Jamaica is divided into three counties: Surrey in the E., Cornwall in the W., and Middlesex in the centre. The counties are subdivided into parishes. The capital is Kingston on the S. coast; it is the chief port and the present seat of government. Spanish Town, 15 m. to the W., was the old capital. Other ports and maritime villages are Montego Bay, Port Antonio, Savanna-la-Mar, Port Maria, St. Ann's Bay, and Falmouth.

Government of the Island

By the constitution which came into force Nov. 20, 1944, the governor is assisted by a house of 32 elected representatives; a legislative council, or upper house, of 15; and an executive council of ten, five appointed by the house of representatives and five by the governor. The franchise is universal at the age of 21. There is no established church. Education is carried out through public elementary schools, vocational schools and colleges, and secondary schools, largely endowed by the government. There is a high court of justice, with circuit courts, and a resident magistrate in each parish.

There are 212 m. of rly. and 2,525 m. of main road; 2,581 m.



Jamaica. Negro types in this British West Indian island. 1. Cane cutters on a sugar plantation. 2. Girls in gowns

of telegraph and 2,819 m. of telephone lines (civil). Regulars supply a garrison; a local militia comprises artillery, engineers, and infantry. Jamaican units did not serve overseas in the Second Great War, but many Jamaicans joined the British forces. In 1940 some 55 sq. m., including Portland Bight and the shore line of Manatee Bay, were leased to the U.S.A. as sites for naval and air bases. The pop. at the 1943 census was 1,237,063, of whom 13,809 were white. The estimated pop. in 1955 was 1,553,700.

Jamaica was discovered by Columbus in 1494 and settled by the Spaniards in 1509. It remained under Spanish domination until 1655, when it was taken by a force sent out by Cromwell under Admirals Penn and Venables, and its possession by Great Britain was confirmed by the treaty of Madrid in 1670. The natives had virtually died out and the pop. at the time of capture by the English did not exceed 3,000. The island was quickly colonised by disbanded soldiers from the parliamentary army, who were governed by military laws until the Restoration. Peasants emigrated from England, Scotland, and Ireland, and the slave traffic began. The Spaniards fled to Cuba, and negroes were imported from Africa. Port Royal became a centre for the transshipment of negroes to the neighbouring islands and the mainland of America. A constitution was granted by Charles II in 1662, but abandoned four years later in favour of a governor and council, partly official and partly elective. This form of government ceased in 1866, and in 1884 representative government was established.

In 1692 most of the town of Port Royal was engulfed in an earthquake. Cyclones in 1712 and 1722 devastated it, and a fire in 1815 completed its destruction. In 1903 a hurricane caused enormous damage in the island, and an earthquake in 1907 shattered Kingston, involving the loss of 1,000 lives. See Cayman Islands; West Indies Federation. *Consult* History of Jamaica, W. J. Gardner, 2nd ed. 1909; Jamaica, Lord Olivier, 1936; H.M.S.O. reports.

Jamalpur. Town in the Monghyr dist. of Bihar, India, lying S. of the Ganges. Railway workshops provide the chief employment. Pop. (1951) 44,172.

Jambol or **YAMBOLI.** Town of Bulgaria. It is situated on the Tunja, about 60 m. N. of Adrian-

ople (Edirne), with which it is connected by rly. and a direct high road. The chief export is attar of roses. Pop. 24,920.

Jamboree. American Indian word for a merry meeting, carousal, or joyful gathering of the tribes. Like many other Indian words and institutions, it has been adopted by the Boy Scouts (*q.v.*). Great jamborees of scouts drawn from many foreign countries were held, *e.g.* in London, 1920; Copenhagen, 1924; Birkenhead, 1929; Gödölo, Hungary, 1933; Vogelenzang, Netherlands, 1937; Moisson, France, 1947; and Sutton Coldfield, 1957. An international scout magazine called Jamboree was started in 1921.

James. Largest river of Virginia, U.S.A. It rises in the W. of the state, in the Alleghenies, and flows 450 m., alternating between a S.E. and a N.E. course, cutting its way through the Blue Ridge Mts., and emptying into Chesapeake Bay at Hampton Roads. It becomes tidal below Richmond, at the head of navigation for steamboats, and 150 m. from the mouth. Liners may go up it 66 m. to the mouth of the Appomattox, the chief tributary. Falls at Richmond supply water power. The Kanawha Canal follows the river course for 200 m. from Richmond to Buchanan. The James is one of America's most historic rivers, largely because of Jamestown (*q.v.*), the first permanent English settlement in America. A bridge over the river at Newport News is with its approaches 6 m. long.

James or **DAKOTA.** A river of the U.S.A. Rising in the east-central part of N. Dakota, it flows generally S. across S. Dakota for over 450 m., and enters the Missouri river about 11 miles below the city of Yankton.

James. A masculine Christian name, really a variant of Jacob (Hebrew, supplanter). The Latin form is *Jacobus*, the French *Jacques*, and the German *Jakob*. It was early popular in Scotland because of its use by the Stuarts, and after 1603 became so in England. *Jeames*, an old spelling, is now used as a nickname for a flunkey. *Jacqueline* is a feminine derivative, as are the rarer forms *Jacoba*, *Jacquetta*, and, in Scotland, *Jamesina*.

James. Saint and apostle. A fisherman of Galilee, he was probably the elder brother of John, and a son of Zebedee. He became one of the twelve apostles. His mother, *Salômē*, is said to have been the aunt of Christ. He was

put to death by Herod Agrippa in 44 (Acts 12). His festival is kept on July 25. See John.

James. Brother of Jesus Christ. The relationship implied has been much discussed. The suggestion that Mary had children besides Christ is contrary to Christian tradition; and there is no mention of such persons in the history of the early Church. James may have been the son of Joseph by a former marriage or the cousin of Christ. He was not one of the disciples, and was converted to Christianity only after the Resurrection, when Christ appeared to him. Known as James the Just, he rose to be head of the Church at Jerusalem. He was a man of ascetic life and was the author of the Epistle which bears his name. He was thrown from a pinnacle of the Temple at the instigation of the Scribes and Pharisees, and then killed by a blow from a club, or, according to another account, was stoned to death by order of the high priest in 62 (Acts 15 and 21).

James. One of the twelve apostles. Son of Alphaeus, he is known as James the Little, to distinguish him from James, the son of Zebedee (Matt. 10; Luke 6). He shares with S. Philip a festival on May 1.

James, THE EPISTLE OF. One of the N.T. Epistles. It belongs to the group known as the Catholic Epistles, from being addressed, not to particular communities, but to Christians in general. The author is usually identified with James, the Lord's brother (*q.v.*). The fact that the Epistle is more Jewish than Christian has suggested that it was addressed to Jews rather than to Christians. The writer includes some sayings of Jesus, but is silent about His life and death. Apparently, therefore, he wished to commend his teaching and to avoid any reference to the Cross. The Epistle is democratic in tone and tenets, and has been regarded as in some respects a sort of charter of Christian Socialism. It is not referred to before the time of Origen, but is perhaps the earliest of the books of the N.T. See Bible; New Testament.

James I (1566–1625). King of England from 1603 to 1625; he was also king James VI of Scotland from 1567. Born in Edinburgh, June 19, 1566, he was the son of Mary Queen of Scots and Lord Darnley. In 1567 he was proclaimed king, but his personal reign did not begin until 1583. Under various guardians he was thoroughly educated, George Buchanan

being one of his tutors. He lived mainly at Stirling, his person occasionally in danger of seizure by turbulent nobles, as indeed happened in the raid of Ruthven in 1582. For twenty years before becoming king of England, James really ruled Scotland. His great work was to make the nobles subservient to the crown, no light task, but one which he appears to have accomplished. He had strong ideas on ecclesiastical matters, where his policy was to make the state superior to the church, the very opposite of that favoured by a strong section of the Presbyterians.

The death of Elizabeth in March, 1603, made James king of England. At once he was confronted with difficulties, which his own behaviour did not make smoother. The methods which had succeeded in Scotland were of no avail in a country where the law was already supreme, and the crown dependent for its supplies on the goodwill of a parliament which had no inclination to surrender a fragment of its rights to a king unacquainted with English traditions and insistent upon doctrines of divine right, which it regarded with suspicion. A serious struggle between crown and parliament was only postponed because the king preferred scolding and giving way to risking a breach with his subjects.

Down to 1612 James allowed himself to be guided mainly by the opportunist statesmanship of Robert Cecil, earl of Salisbury. These first years of his reign were marked by the disappearance of the

hopes both of the Catholics and of the Puritans, who both expected favours from him. The Gunpowder Plot in 1605 made popular opinion incurably hostile to the Romanists, while the king found his surest support in strengthening the authority of the prelates. In 1604 he brought to an end the long war with Spain, and much thought was expended in seeking an alliance between the royal houses of the two countries. Against his will, for Buckingham was now in control of foreign policy, he found himself dragged into the Thirty Years' War on behalf of his son-in-law, the elector palatine. He died at Theobalds, March 27, 1625. James married in 1589 Anne, daughter of Frederick II, king of Denmark. Three of his children were Henry, prince of Wales (d. 1612), Charles I, and Elizabeth, from whom the present royal family is descended.

James was a man of poor physique and ungainly appearance, with legs almost too weak to support him, and a tongue too large for his mouth. He showed a great partiality for certain handsome but worthless men; was untrustworthy and deceitful, tactless and thriftless, slovenly, and continually talking. On the other hand, he was one of the ablest of British sovereigns, a thinker, and probably the only one who would have won fame by his intellectual gifts alone. These gifts are seen in his writings, which include essays, poems, and meditations. Better known are his *Basilicon Doron* and his *Counterblaste to Tobacco*. His political and ecclesiastical ideas are developed in the *Basilicon*, and in a tract, *The True Law of Free Monarchies*. He also wrote *Daemonologie*, a short work against witchcraft. His works were published in 1616, and some are in E. Arber's *English Reprints*. See *Basilicon Doron*; *Divine Right*; *Gowrie Conspiracy*; *Gunpowder Plot*; *Ruthven, Raid of*; *Scotland*; consult *James I and VI*, T. F. Henderson, 1904; *James I*, C. Williams, 1934; *James VI and I*, D. H. Wilson, 1956.

James II (1633-1701). King of Great Britain and Ireland 1685-88. The younger son of Charles I and brother of Charles II, he was born at St. James's Palace, London, Oct. 14, 1633. Throughout his brother's reign he was heir presumptive to the throne, to



James II. Statue by Grinling Gibbons, long in St. James's Park, re-erected outside the National Gallery 1843

which he succeeded Feb. 6, 1685. He married first, in 1659, Anne Hyde, daughter of Lord Clarendon. Their daughters, Mary and Anne, both became queens of England. In 1673 he married Mary of Modena, the mother of his son James Edward, whose birth in 1688 precipitated the Revolution. As a young man James displayed marked courage in the field, and as admiral he was sincerely devoted to the development of the navy, though he displayed no great skill as a commander. He openly professed the Roman Catholic faith, although by doing so he endangered his prospects of succeeding his brother.

The final defeat of the Exclusion Bill and the rout of the Whigs in 1681 secured him the throne when Charles died. The rising of Monmouth proved only that a policy of moderation would ensure national loyalty; but the king did not pursue a moderate policy. He deliberately drove Anglican sentiment and constitutional sentiment as well into opposition by arbitrarily dispensing, in individual cases, with the disabilities imposed by the law upon Roman Catholics and Protestant Non-conformists, by replacing Churchmen by Romanists, and finally by the Declaration of Indulgence.

The arrest, trial, and acquittal of the seven bishops, 1688, turned public sentiment solidly against the king, and the standing army on which he relied shared the popular feeling. The belief that the son just born (June 10) to the king was supposititious decided the question. Leaders of both parties combined to invite the intervention of William of Orange, and when he



James I

(James I of Great Britain)

After Daniel Mytens



James II, King of Great Britain

After Kneller



James. Portraits of the kings of Scotland. Left to right: James I, 1406-37; James II, 1437-60; James III, 1460-88; James IV, 1488-1513; James V, 1513-42

landed at Brixham, Nov. 5, the bulk of the army went over to his side. Although it was not William's ostensible purpose to depose his father-in-law, James fled from the country and took refuge with Louis XIV of France.

Ireland, mainly Roman Catholic, provided James with a base for further effort. Thither he betook himself, but on suffering a severe, though not overwhelming, defeat at the battle of the Boyne (July 1, 1690), he withdrew to France, and the capitulation of Limerick (Oct. 3, 1691) ended all hopes from Ireland. During the next ten years James remained at his court of St. Germain, the guest of Louis XIV. His schemes for recovering his crown by an invasion with the aid of Louis were wrecked by the decisive sea fight of La Hogue (May 19, 1692). Sundry abortive plots, not always sanctioned by James himself, for the capture or assassination of William, were detected and suppressed with singular leniency. On James's death (Sept. 6, 1701) Louis acknowledged his son James Edward as lawful king of England. There are Lives by J. S. Clarke, 1816; H. Belloc, 1928; F. M. G. Higham, 1934.

James I (1394-1437). King of Scotland. The son of King Robert III, he was born at Dunfermline in July, 1394. In 1406 he was sent to France, but on the way he was captured by some English sailors, and until 1424 was a prisoner in England. His education, however, was carefully attended to.

In April, 1406, James became nominally king of Scotland, but the kingdom was under regents, and it was not until after the death of Henry V in 1422 that they took steps for his release. This was effected by a treaty, when a sum of money was paid for the king's maintenance and a marriage, celebrated Feb. 12, 1424, was arranged between him and Jane Beaufort, daughter of the duke of Somerset. During his reign James dealt sternly with the unruly nobles; Murdoch, duke of Albany, his sons and others were put to death, while steps were taken towards a more constitutional form of government. His policy, however, led to a con-

spiracy against him, and on Feb. 20, 1437, James was murdered at Perth. He left a son, James II, and six daughters, one being the wife of Louis XI of France. James won a reputation as a poet and was a man of exceptional culture. Two poems by him are extant: *The Kingis Quair* (King's Book) and *Good Counsel*, while others may be his. *Consult* Romance of a King's Life, J. A. A. Jusserand, 1897; Life, E. W. Melville, 1936.

James II (1430-60). King of Scotland. The son of James I and an Englishwoman, Jane Beaufort, he was born Oct. 6, 1430. He became king in 1437, and as usual, the time of the regency was one of civil discord; the Douglasses were then very powerful, one of them being regent. In 1449 James assumed power, but the trouble continued, being chiefly marked by warfare between the king and the Douglasses, caused partly by the murder of the earl of Douglas by James at Stirling in 1452. James became also involved in a war with England. Later he took up arms for the Lancastrian party therein, and was killed whilst besieging Roxburgh Castle, Aug. 3, 1460. He married Mary, daughter of the duke of Gelderland, of his three sons the eldest was James III.

James III (1451-88). King of Scotland. Born July 10, 1451, he succeeded his father James II as king in 1460. Regents governed the kingdom until about 1469, and for the rest of the time James was constantly at war with his nobles. His fondness for music and culture generally made him an unsuitable ruler for Scotland in the 15th century, and when some of the nobles persuaded his young son, afterwards James IV, to rebel, the end came. Near Bannockburn the king's army met the insurgents, but James was defeated and fled. He took refuge at Beaton's Mill, where he was killed on June 11, 1488. His wife was Margaret, daughter of Christian I, king of Denmark.

James IV (1473-1513). King of Scotland. Born March 17, 1473, James succeeded to the throne on his father's death, 1488. The comparative quiet of his reign allowed him to mix in foreign

politics to an extent unusual for a Scottish king. He had intercourse with the pope, the emperor, and the kings of France, Spain, and Denmark, and married Margaret, daughter of Henry VII of England, an alliance which led to the union of the two crowns in 1603. With his brother-in-law, Henry VIII, James soon quarrelled, and when war broke out the two armies met at Flodden, where, on Sept. 9, 1513, James and many of his nobles were killed. He was very popular with his people, and appears to have been an able and interesting, if somewhat licentious, man.

James V (1512-42). King of Scotland. Born at Linlithgow, April 10, 1512, James was not two years old when his father's death at Flodden made him king. At the age of twelve he was declared fit to rule, but one noble or other kept him in his power for some time longer. James's real reign, which began about 1530, was marked by troubles with his nobles and with England, and in 1542 the English invaded Scotland. In Nov. the Scots were routed at Solway Moss, and the king, grieving over this disaster, died at Falkland, Dec. 14, 1542. He had married Mary, daughter of the duke of Guise, and his only legitimate child was Mary Queen of Scots. Of his illegitimate children the most notable was the regent Murray.

James Edward (1688-1766). Jacobite prince, known as the Old Pretender. Born in London, June



James Edward, The Old Pretender

10, 1688, he was the son of James II, and his second wife, Mary of Modena, although stories were circulated that he had been smuggled into the palace. He was immediately hurried over to France and was living at St. Germain when his father died in 1701, and he inherited his claim to the throne of Great Britain. Several attempts were made to secure this, the most notable being in 1715 and 1745, and twice James himself sailed for

Scotland, once in 1708 and again in 1715, when he landed at Peterhead, on both occasions returning to France without disaster. In 1715, in consequence of peace between England and France, James left France for Bar-le-Duc in Lorraine, but his concluding years were spent in Rome. Since 1702 he had been under an attainer passed by the English parliament.

James married in 1719 Maria Clementina, granddaughter of John Sobieski, king of Poland, but the union was unhappy, and in 1735 Clementina died. Their family consisted of two sons, Charles Edward (*q.v.*) and Henry, Cardinal York. James died in Rome, Jan. 2, 1766, and was buried in S. Peter's. See Jacobites.

James, ALEXANDER (1901-53). British footballer. A native of Glasgow, born Sept. 14, 1901, he appeared for Raith Rovers in 1922. He entered English league football with Preston North End, 1925; and in 1929 was transferred at a fee of £9,000 to Arsenal, with whom he became the most prominent player of his time. He was in the Cup-winning teams of 1930 and 1936, and represented Scotland in eight international matches, retiring from regular play in 1937. An inside-left who ranked with the greatest forwards, James was not renowned as a goal-scorer but as a strategist with unequalled ball control and footwork. He died June 1, 1953.

James, GEORGE PAYNE RAINSFORD (1799-1860). British novelist. Born in London, Aug. 9, 1799, the son of a physician, he early developed a taste for history, which found expression in a long series of romances, the first being *Richelieu*, 1820. He is



G. P. R. James,
British novelist

credited with about 100 novels in all, melodramatic and artificial, but with a flavour of romance and excitement which commended them to a large circle of readers. His fondness for opening with a description of two horsemen, one dark and the other fair, is burlesqued by Thackeray in *Barbazur* in the *Novels by Eminent Hands*. He held several consular appointments, including one at Venice, where he died May 9, 1860.

James, HENRY (1843-1916). U.S.-born British novelist. He was born in New York, April 15, 1843,

son of Henry James, a well-known Swedenborgian, and younger brother of William James (*q.v.*). He was educated at Harvard, with a view to a legal career, but early turned his attention to literature, at first in the form of short stories and contributions to periodicals. The first novel to bring him recognition was *Roderick Hudson*, 1875. This was followed by some forty to fifty books, most of them novels. James excelled in delineating the contrast between the new civilization of America and the older civilization of Europe. Interested in the development of character rather than in incident, and in suggestion rather than in direct statement, he is perhaps unsurpassed in minute and subtle analysis of the psychology of his creations. His prose style is marked by the evidence of continuous selection of the exact word to convey his nuances of significance.

From 1869 he made his home in Europe, living chiefly in London and at Rye in Sussex. Naturalised as a British subject in 1915, he was given the O.M. in January, 1916, and died February 28, at Chelsea; memorials were placed in Chelsea old church and library. His novels include *The American*, 1877; *Daisy Miller*, 1878; *The Europeans*, 1878; *A Bundle of Letters*, 1879; *Washington Square*, 1880; *The Bostonians*, 1886; *The Tragic Muse*, 1890; *What Maisie Knew*, 1897; *The Turn of the Screw*, 1898; *The Awkward Age*, 1899; *The Wings of a Dove*, 1902; *The Golden Bowl*, 1905; and *Julia Bride*, 1909. James's wide knowledge of French literature is reflected in his *French Poets and Novelists*, 1878.

Bibliography. H. J., a *Critical Study*, F. H. M. Hueffer, 1913; *The Pilgrimage* of H. J., Van Wyck Brooks, 1928; *Letters* to A. C. Benson and A. Monod, ed. E. F. Benson, 1930; *Letters*, ed. Leon Edel, 1958.

Lamb House, Rye, where James lived 1897-1916, was given to the National Trust in 1950, to be preserved as a museum.

James, MONTAGUE RHODES (1862-1936). A British scholar. Born Aug. 1, 1862, at Liverpool, Suffolk, he was educated at Eton and King's College, Cambridge. He was provost of King's 1905-18, and

resigned on being made provost of Eton. At Cambridge he was also director of the Fitzwilliam museum, 1894-1908, and vice-chancellor, 1913-15. He wrote on Biblical and historical subjects, also editing apocryphal writings and medieval manuscripts. To the general public he was best known by several volumes of ghost stories. Many honours and in 1930 the O.M. were conferred on James, who died June 12, 1936.



Montague R. James,
British scholar
Russell

James, WILLIAM (1842-1910). American philosopher. Brother of Henry James, he was born in New York, Jan. 11, 1842. Trained for the medical profession, he did not practise, but in 1872 became instructor in comparative anatomy and physiology at Harvard. In 1881 he became professor of philosophy there. He died at Chocorua, N.H., Aug. 26, 1910.

His *Principles of Psychology*, 1890—one of the most lucid, penetrating studies of the day—became a standard work, and its abridgement, *Text-book of Psychology*, was more widely read than any comparable publication. An essay, *The Will to Believe*, and *Talks to Teachers in Psychology*, both appeared in 1899. Throughout his writings James stressed the psychological phenomenon of the will to believe, as well as the pragmatic sanction of belief, and in his final years he perfected his philosophical system on that basis. Pragmatism, a New Name for Some Old Ways of Thinking, 1907, established James as a philosopher. Insisting upon the activity and creativeness of consciousness rather than upon its passive receptivity, he paved the way for the developments of the



William James,
American
philosopher

20th century psychology. Emotions, he taught, are the direct awareness of physiological changes. *Con-*
sult The *Philosophy of William James*, T. Flournoy, 1917; *Introduction to the Philosophy of William James*, N. M. Kallen, 1925; *Letters*, edited by his son Henry, 1926. See *Pragmatism*.

James Bay. A large south-eastern extension of Hudson Bay, Canada. It lies between Ontario on the W. and Quebec on the E., and between lat. 51° and 55° N. and long. 79° and 82° 50' W. It contains numerous small islands on the E. side, and the large islands of Akimiski on the W., and Charlton in the S. The Albany, Ekwan, Moose, and Attawapiskat rivers discharge into it on the W. side, and Rupert on the E. It is 350 m. long from N. to S., with a maximum width of 120 m. The water is brackish and extremely shallow. Moose Factory lies at the end of a deeper central channel, where the tide rises 9 ft. See Hudson Bay.

Jameson, Sir LEANDER STARR (1853-1917). British administrator. Born in Edinburgh, Feb. 9, 1853,



Sir Starr Jameson,
British administrator
Russell

he became house surgeon and physician at University College Hospital, London, but a breakdown in health caused him to give up practice in London, and to establish him-

self at Kimberley, South Africa, in 1878. Here began his lifelong friendship with Cecil Rhodes, at whose invitation he gave up medical practice to act as ambassador to Matabeleland in 1889, Lobengula, the Matabele chief, having been one of his patients.

The Chartered Company being formed in 1891, "Dr. Jim" was appointed the administrator of Rhodesia. In that capacity he organized the Jameson Raid (*q.v.*), which brought him a sentence of 15 months' imprisonment, May, 1896; but he was released in Dec. owing to ill health. In 1900 he became member of the Cape legislative assembly for Kimberley. During 1904-08, as leader of the Progressives, he was premier, and played a notable part in the formation of the South African Union. Made a baronet in 1911, in 1912 he returned to England, and in 1913 was appointed chairman of the British South Africa company. He died in London, Nov. 26, 1917. A Life by I. Colvin appeared in 1922.

Jameson, (MARGARET) STORM (b. 1897). British novelist. Born at Whitby, she was educated at Leeds university. She attracted attention with a novel, *Happy Highways*, in 1920, and later works sustained her reputation as an engaging and provocative writer,



Storm Jameson,
British novelist

Jamesone, GEORGE (c. 1586-1644). Scottish painter. Born at Aberdeen, he studied under Rubens at Antwerp, and, returning to Aberdeen about 1620, established himself as a portrait painter there, and later at Edinburgh. Charles I visited the Scots capital in 1633, and gave the artist a sitting; Jamesone also painted King James I, Montrose, the first marquess of Argyll, Lady Mary Erskine, James, marquess of Hamilton, John, duke of Rothes, and John, earl of Mar.

Jamesonite. A mineral, lead sulphantimonite ($2\text{PbS} \cdot \text{Sb}_2\text{S}_3$; 51 p.c. lead, 30 p.c. antimony). It occurs in needle-like monoclinic crystals, also fibrous or massive compact, with a steel-grey metallic lustre. Jamesonite, named after Robert Jameson (1774-1854), is found in mineral veins associated with other lead sulpho-salts, some of which probably have been confused with it.

Jameson Raid. Name given to a *coup d'état* attempted in S. Africa in 1895 by Leander Starr Jameson. With the connivance and support of Cecil Rhodes, Jameson had organized a force of some 500 men consisting of Chartered Company police and volunteers, to invade the Transvaal simultaneously with a rising of Uitlanders in Johannesburg. Owing to various difficulties the Uitlander rising was postponed, but in spite of messages from Johannesburg Jameson crossed the Bechuanaland border with his men, Dec. 28, 1895. On Jan. 2, 1896, his small force was surrounded by the Boers under Cronje at Doornkop, and after being without food for 24 hours was compelled to surrender. Waiving their undoubted right to shoot Jameson and his officers as filibusters, the Boers handed them

e.g. *The Lovely Ship*, 1927; *Farewell to Youth*, 1928; *Cousin Honoré* 1940; *The Fort*, 1941; *Cloudless May*, 1943. She edited the *Journal of Mary Hervey Russell*, 1945.

over to the British authorities, and Jameson, his military chief Sir John Willoughby, and minor officers, were sentenced to various terms of imprisonment. The success of the Boers in dealing with the raiders prompted the German emperor to send to President Kruger a telegram of congratulation which aroused much resentment in Britain. The Imperial parliament appointed a select committee to investigate the raid and this issued its report July 13, 1897. It "severely censured" Rhodes, but declared the suggestion that the Colonial office knew in advance of the raid was unsupported by evidence. Consult *Jameson Raid*, H. M. Hole, 1930; J. van der Poel, 1951; also *History of the Times*, vol. III, 1947.

James Tait Black Prizes. British literary prizes founded by Mrs. Janet Coats Black in memory of her husband, a partner in the publishing firm of Black. A capital sum, which by 1946 stood at £12,430, was set aside and the income from this, after paying expenses and a fee of £50 to the judge, provides two annual prizes of approximately £250 each, one being awarded for a work of fiction, the other for a biography. The first awards were in 1919, for H. Festing Jones's *Samuel Butler* and Hugh Walpole's *The Secret City*. Other notable winners were Lytton Strachey, *Queen Victoria* (1921); D. Garnett, *Lady into Fox* (1922); Arnold Bennett, *Riceyman Steps* (1923); E. M. Forster, *A Passage to India* (1924); S. Sassoon, *Memoirs of a Foxhunting Man* (1928); J. B. Priestley, *The Good Companions* (1929); F. Yeats-Brown, *Bengal Lancer* (1930); W. Holtby, *South Riding* (1936); L. A. G. Strong, *Travellers* (1945); R. Aldington, *Wellington* (1946).

Jamestown. Capital and seaport of St. Helena. It has a roadstead affording good anchorage. Longwood (*q.v.*), the residence of Napoleon, 1816-21, is 3 m. distant.



Jamestown, St. Helena. View from the sea showing the roadstead and Ladder Hill

Jamestown. City of New York, U.S.A., in Chautauqua co. It stands at the S. outlet of Chautauqua Lake, 70 m. S.S.W. of Buffalo, and is served by rly., airport, and steamer. Settled in 1810, it was incorporated in 1827 and became a city in 1886. Amid dairy farms, vineyards, orchards, and on a natural gas field, it is one of the leading centres of furniture making in the U.S.A. Many of its people are of Swedish origin. Pop. (1950) 43,354.

Jamestown. Former town of Virginia, U.S.A., in James City co. It was the first permanent English settlement in the Americas, and was founded on May 13, 1607, by Captain John Smith (*q.v.*) and 104 others sent out to the colony by the London Company in three vessels. They landed on a peninsula in the river James, some 30 m. from its mouth. During the first seven months the colonists were reduced to 32 by famine and disease. By 1609 the colony had begun to prosper.

At Jamestown in 1619 the first legislative assembly in America met; and here slavery began in the original thirteen colonies. The town was destroyed by fire in 1608, burnt to the ground by Nathaniel Bacon in the rebellion of 1676, and in 1698 again partly destroyed by conflagration. Thereupon the seat of government was transferred to Middle Plantations (Williamsburg).

The action of the river converted the peninsula into an island, which, with the ruins of the tower of the colony's fifth church, and the remains of a few houses, was acquired in 1893 by the Association for the Preservation of Virginia Antiquities. In 1901 the federal government built a sea wall. In 1933 the state and federal governments purchased the island as part of a national park.

Jammes, FRANCIS (1868–1938). French author. Born at Tournai, Hautes-Pyrénées, Dec. 2, 1868, he spent most of his life at Orthez, Basses-Pyrénées, and in the Basque country; his work reflects a love of nature and understanding of provincial character. His first notable volume was *Le Deuil des Primavères*, a collection of beautiful elegies, 1901. In 1902 came his masterpiece, *Le Triomphe de la Vie*, a rustic epic. The best of his later poetry is in *L'Eglise Habillée de Feuilles*. In 1905 his conversion to Roman Catholicism imposed restraint in theme and style. He continued to write prolifically until his death on Nov. 1, 1938.

Jammu. District and city of Kashmir. The city, the winter capital of the state, has an important pharmaceutical laboratory. The area of the dist. is 1,167 sq. m. Pop. (est.) dist., 326,700; city, 36,550.

Jammu and Kashmir is the full name of the state described in this work under the heading Kashmir.

Jamnagar. See Nawanagar.

Jamrach. Family of dealers in wild animals. The founder of the business was a harbour-master of Hamburg. He worked up a connexion in buying from sailors animals and curios, of which his son Charles (1815–91) disposed in Europe. Charles moved to London about 1840 and set up in business in Ratcliffe Highway, near the docks, importing wild beasts and snakes from all parts of the world and selling them to menageries and zoological gardens. His sons, Albert (1846–1917) and William, succeeded him, but latterly confined themselves almost exclusively to the importation of rare birds into the United Kingdom.

Jam Session. Term given by jazz musicians to an occasion when, in response to a momentary mood, they follow a melodic fragment casually played by one of their number with improvised strands of melody and counter melody each on his own instrument. An arranged jam session is a contradiction in terms.

Jamshedpur. City of India, in Bihar. Founded in 1909 as the headquarters of the Tata iron and steel works, it is about 140 m. W. of Calcutta near the Subarnarekha river. It is named after Jam Shodji Tata, who first advocated the exploitation of the coal and iron deposits of the Sonthal jungles. These minerals occur throughout most of the Chota Nagpur plateau. Pop. (1951) 218,162.

Jamshid. Traditional ruler of Persia. He is reputed to have flourished about 1000 B.C., and his memory is associated with the possession of a magical cup that contained the elixir of life. Jamshid's cup is referred to in Fitzgerald's *Omar Khayyám*, and in Moore's *Lalla Rookh*.

Jane, FRED. T. (1870–1916). British naval writer. Born Aug. 6, 1870, at Up-Ottery, Devon, he made some early mark as a black-and-white artist and as a novelist. In 1898 he first published the well-known annual *All the World's Fighting Ships*. He brought out *All the World's Airships* in 1909 (transformed under C. G. Grey in 1916 to *All the World's Air-*

craft). Of Jane's novels, *The Passen and We*, 1896, and *Ever Mohun*, 1901, contained studies of Devon life. He invented the Naval War Game. He died March 8, 1916.

Jane Eyre. Novel by Charlotte Brontë, published under the pseudonym Currer Bell in 1847. It at once achieved striking popularity and established its author's reputation. By way of protest against the conventional beautiful heroines of fiction, Charlotte Brontë determined to present one as plain and small as herself and yet interesting. She succeeded triumphantly in the presentation of Jane Eyre, the governess who tells the story in the first person, and her relations with Rochester, a big masterful man with an insane wife in the background. The book, described as an autobiography, challenged attention by its frank unconventionality and the vigour of its style.

Jane Seymour (c. 1509–37). Third queen of Henry VIII of England. Eldest child of Sir John



Jane Seymour,
third queen of
Henry VIII

Seymour, of Wolf Hall, Wilts, and sister of the 1st duke of Somerset, she was a lady-in-waiting to Catherine of Aragon. Henry became enamoured of her while married to Anne Boleyn.

On the day after Anne's execution, Jane was betrothed to the king; the marriage was solemnised May 30, 1536. She was never crowned, and died Oct. 24, 1537, twelve days after giving birth to a son who became Edward VI.

Janet, PAUL (1823–99). French philosopher. Born in Paris, April 30, 1823, he became professor at Strasbourg, 1848–57, and at the Sorbonne, 1864–97. He died in Paris, Oct. 4, 1899. An eclectic and a disciple of Victor Cousin, he was a strong opponent of materialism. Matter without force is to him an abstraction; the soul is an immaterial force acting upon, and reacted upon by, the body. His general standpoint is an enlightened spiritism—the theory that soul or spirit exists apart from the body and is the only real existence. His most important works are *Materialism of the Present Day*, Eng. trans. G. Masson, 1866; *History of Moral and Political Philosophy*, 3rd ed. 1887; *The Philosophy of Happiness*, 5th ed. 1891.

